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Direct Costing in Perspective

by JOHN A. BECKETT

Treasurer, Spreckles Sugar Co., San Francisco, California

Another appraising look at the essentials and services of direct costing is provided by this article, which also compares its usefulness to that of full or absorption costing in identical areas, such as profit determination, pricing, cost control, and others. The mixed verdicts arrived at suggest that direct costing has amplified the number of available accounting techniques but has not sustituted for any other.

THE PURPOSE OF THIS PAPER is to attempt to clarify the objectives of direct costing and thereby to remove some of the confusion which presently surrounds the subject. To the extent that it succeeds it is hoped that it will contribute further to the beneficial effects of the direct costing development. There is one fact which should be made most clear at the outset. Although direct costing may have been represented by others to be a means of providing "magic answers" to most of the deficiencies of accounting and many of the problems of business, that representation will not be found in these paragraphs.

How Direct Costing Got Its Name

First of all, about the subject itself. It is called direct costing, but might have been given other designations. It might be called direct cost accounting. It might even be called variable cost accounting, except that variable accounting gives the implication of unstable accounting and might not be a good term for that reason. Jonathan Harris gets credit for developing the idea of direct costing in this country. He used the term direct costing when he wrote his now famous article in 1936. About 1946, there appeared the earliest articles in American

literature to employ the term "responsibility accounting." The concept embodied in that name is closely allied to that implied in the term "direct costing" and is, perhaps, even more expressive and meaningful by itself than is direct costing. The first article in this country which used the term direct costing in the title was published in the *N.A.C.A. Bulletin* as recently as January 1951 and was written by Waldo Neikirk, then a colleague of Mr. Harris.

Such is the background of the term and the other names which could be or have been used to mean the same thing. The term direct costing is now pretty well engrained in the literature. There have been a number of articles on the subject using that term and the N.A.C.A. has published a special study under that title. So the name probably will stick, even though it may not be the most descriptive one. However, as will be shown in subsequent pages, the emphasis of direct costing is on the objective of control in the short-term sense. Therefore, it would seem that some of the confusion which surrounds the subject could be removed if the name were made more descriptive than it is. Although "responsibility accounting" is a step in the right direction, a more definitive term might be "control accounting." Some consideration for that term is therefore proposed to the profession.

The Underlying Objectives of Financial and Cost Accounting

Before answering the question, what is direct costing?, let us have a look at what financial and cost accounting are about, and then find out what direct costing is by contrast and by comparison. Financial accounting as we know it today is a collection of principles expressed in techniques and devoted to the promotion of four fundamental objectives. These objectives are:

1. Measuring profits.
2. Assisting in pricing.
3. Promoting control of costs and expense.
4. Facilitating "economic analyses" (cost studies).

When the principles of accounting were first developed, they were directed primarily at the problems of measuring profit for undertakings in which a number of different owners were gathered together in common endeavor to produce something which they, as individuals, could not produce alone. For example, the construction of the great memorials and edifices of the eastern Mediterranean required the banding together of a number of men of capital long before the time of Christ. They participated in the many subcontracts which were necessary to gather materials from great distances and to put them together in the form of temples or pyramids or other structures.

Since it was necessary for the life of the undertaking to be unrelated to the

lives of the individuals who joined together to make it possible, it was necessary to have tools which would facilitate the measurement of the interests of each party in the total endeavor, that is, it was necessary to be able to measure profit not only at the conclusion of an undertaking but also at any time in the interim during which the part of one capitalist might be concluded by death, dispute, or other cause for discontinuation.

The emphasis on the measurement of profit was then a natural emphasis since that was the major problem facing the keepers of records in those times. It has prevailed through the years and has been the basic theme of most accounting writings until the past 30 years. Indeed, it is still the subject of much writing, particularly by economists and accounting scholars. Each year there are many doctoral theses devoted to the question of, how do you measure profit?, especially during the eras of decreasing values of the dollar.

However, there has been a trend away from this emphasis. As technology has increased in complexity and as accounting has developed to meet its problems, there has been an increasing emphasis on the assignment of costs in such a way as to determine the costs of products so that their "total cost" could somehow be ascertained. In earlier years, the emphasis on inventory valuation techniques was primarily directed to the end of measuring profit, as witness the periodic physical inventory method with valuation at the lower cost or market as the most common means of computing profit. During the era of the industrial revolution, the determination of cost for the purpose of "computing" selling prices became more popular and much of that philosophy appears to prevail in the business fraternity and the accounting profession to this day.

Traditionally, it has been assumed that there should be a consistent relationship between the cost of a product and its selling price. It has been implicitly assumed by many people for many years that "you must know what your total costs are for each product before you can determine what you should sell that product for." Whether prices are "set" by the makers of goods or by the people who buy them seems to have become a basic question only in fairly recent years when competition has come to play a substantial part in business activity. It cannot be prudently argued that one does not need to know the cost of his products if he is to sell them. It may be questioned, however, whether in many cases he—the manufacturer—really sets the selling prices of the products he makes.

In many cases, the knowledge of product costs is valuable primarily so that the manufacturer may know whether or not his product should be made and sold in the structure of competitive prices which exist in the market for his goods. In short—pricing is not a science, it is an art. Unless a single company holds dominion over the entire market for the products it makes (and very few com-

RESULTS WHICH CAN BE PRODUCED BY ORTHODOX ACCOUNTING

	January	February	
(V) Revenue from goods sold	$300,000	$ 300,000	100.0%
(M) Cost of goods sold (including factory overhead at standard burden rates)	246,000	246,000	82.0
Gross profit	$ 54,000	$ 54,000	18.0
Other expenses:			
(V) Selling expenses	$ 20,000	$ 20,000	
(F) General and administrative expenses	19,000	19,000	
(M) Over-and under-absorbed burden	(8,100)	8,100	
Total other expenses	$ 30,900	$ 47,100	
Net operating profit	23,100	6,900	

V = Variable F = Fixed M= Mixed

Note: Variations in production influence the amount of profit shown. Expenses are arranged without reference to their variability or fixity.

EXHIBIT 1

panies do), there will inevitably be varying relationships between its costs and its selling prices for different products. Although a company's total costs must be borne entirely by its total revenues if it is to make a profit, it cannot and should not be expected that all products will contribute equally or consistently.

Only in recent years has the third objective of accounting, promoting control of costs and expenses, become a major importance. Since the days of Taylor, Gantt, McKinsey, and Gilbreth, accounting has begun to play an increasingly important part as a means of assisting managers to run their business more effectively. The concept of standards and budgets for setting objectives for, and limitations on, costs has required the "coming of age" of accounting as a control tool for management.

Finally, data of all sorts are needed in order to narrow the area of guesswork with regard to problems involving alternative choices for future activity, i.e., for facilitating economic analyses. For example, questions regarding whether or not a sub-assembly should be made or bought can normally be much more effectively appraised if one knows how much it costs to make a product. Accounting costs help to supply these data and thus provide a beginning to the solution of whether or not the product should be bought or sold. These costs do not provide final answers. They simply narrow the margin between guesswork and solution, yet they are essential to the solution of many problems which daily face the businessman in his choice from among alternative solutions available to him.

These, then, are the objectves of financial accounting and this is the chronological order in which they became recognized. The history of cost accounting is shorter, but it is similar. It is simply a compressed history of financial accounting. Cost accounting is nothing really different. It is mostly a sphere of accounting in which one applies in greater depth the principles of financial accounting. Although the procedures are more complex, the objectives are the same, and they were developed in the same sequence.

Direct Costing Supplies New Emphases

When candled against the same background as financial and cost accounting, direct costing shows characteristics which are in some respects similar and in others slightly dissimilar. To observe those similarities and dissimilarities, it is helpful to compare the characteristics of direct costing individually against the basic objectives which have been explored in earlier paragraphs. To begin with, a look at the titles of a selected list of articles on the subject certainly indicates one thing very clearly about direct costing. It is a tool of management. Here are the titles of a few articles:

"What Can We Expect of Direct Costing — As a Management Tool?" Paul Taylor (*N.A.C.A. Bulletin*, July 1953, Conference Proceedings). "Direct Costs as an Aid to Sales Management," Johnathan Harris (*The Controller*, October 1948). "How Direct Costing Can Work for Management" Waldo Neikirk (*N.A.C.A. Bulletin*, January 1951).

The best definition of direct costing to be found in literature, it seems to me, is that contained in an article by Mr. Neikirk, as follows:

> "Direct costing should be defined as a segregation of manufacturing costs between those which are fixed and those which vary directly with volume. Only the prime costs plus variable overhead costs are used to value inventory and cost of sales. The remaining factory expenses are charged off currently to profit and loss. However, the point to be emphasized is that direct costing is primarily a segregation of expenses and only secondarily a method of inventory valuation. By this approach, full attention can be devoted to the effect which direct costing has on the profit and loss statement and supplementary reports."

Direct costing is many things to many people. To those who understand it best, it is simply an emphasis in accounting which calls for renewed concern for the desirability of using business data for assisting people to improve their performance through better control. To list the objectives of direct costing, then, is simply to list in a different order the objectives we have already listed for cost accounting and for financial accounting. Here is the order:

Cost control	The primary emphasis
Profit measurement	The secondary emphases and optional aspects
Economic analyses	
Pricing	

This, then, is direct costing, not something different so far as the objectives of accounting are concerned but something which is dedicated to the same end that conventional accounting is dedicated to. There are differences, true, but they are not differences in objectives. They are differences primarily in emphasis.

KIND OF RESULT PRODUCED BY DIRECT COSTING

		January	February	
(V)	Revenue from goods sold	300,000	300,000	100.0%
(V)	Direct cost of goods sold	150,000	150,000	50.0
	Gross margin over direct cost	150,000	150,000	50.0
(V)	Selling expenses	20,000	20,000	6.7
	Merchandising margin	130,000	130,000	43.3
	Other expenses:			
(F)	General and administrative expenses	19,000	19,000	
(F)	Fixed factory overhead	96,000	96,000	
	Total other expenses	115,000	115,000	
	Net operating profit	15,000	15,000	

V = Variable F = Fixed

With this arrangement:

1. Profits are not affected by variations in production. 2. Expenses are arranged in descending order of variability. 3. Fixed expenses are shown to be the same each month. 4. Approximate break-even point is easily computed:

$$\frac{266,000}{.433/115,000} \quad \text{Break-even}$$

5. Gross profit percentage is increased.

EXHIBIT 2

Direct Costing for Cost Control

Following the definition already cited as the best which exists in the literature, consider first the importance of studying expected cost behavior by making an initial segregation of costs into categories of fixed and variable, to promote cost control. When we attempt to separate fixed from variable costs in a manufacturing situation, we immediately have to face up to the question of who is responsible for what cost. That is good. That makes us think about people's responsibilities and lays the cornerstone for developing a program of cost control related to the responsibilities of people in the organization. This is, in fact, precisely what is done in budgeting. Costs are accrued in categories which represent the responsibilities of people. The comparison of actual costs and planned costs gives an indication of success in performance by individual members of the management group. In this respect, direct costing is not something brand new. It is simply a dramatization of the necessity for using accounting data for control purposes. We need that dramatization, for in industrial accounting we have been so concerned with the techniques of assigning costs for profit measurement purposes that we have, at least partly, forgotten the principles of cost control and the classification of costs in terms of their behavior.

It must be conceded that it is easier for one to say that one should make a segregation between fixed and variable costs than it is to make such segregation. Mr. Howard Greer has made the most careful analysis of the difficulties in this regard ("Alternatives to Direct Costing," *N.A.C.A. Bulletin,* March 1954):

> "Within the narrow ranges of overall volume (e.g., 60-80% of capacity) assumptions as to relative variability and fixity may be made without risk of serious error, but, in a large manufacturing operation, there are further complications.
>
> "When major decisions are to be made, it becomes necessary to make a forecast of results for the entire manufacturing operation, with integrated assumptions as to both

the amount and character of the anticipated output, before a safe conclusion can be reached.

"This does not weaken the direct cost argument. It merely broadens its scope and exposes the dangers of oversimplification of either the analyses or the conclusions they suggest."

Mr. Greer's points are good ones. They do not, obviously, mitigate the desirability of attempting such a segregation for control purposes. We do this every day for budgeting purposes. The more difficult it is, the more chance there is for learning a great deal about the opportunities for promoting cost control through careful study of alternative cost behavior.

Direct Costing for Profit Measurement

When you carry the principles of direct costing beyond the base point of segregating costs in terms of variable and fixed and assert that only the variable costs should be assigned to inventory for valuation and profit measurement purposes, then you enter the field of controversy which has stirred up so much feeling to date in the accounting profession. The field of accounting has become divided into three separate camps in this respect. The first camp is occupied by those who endorse the principles of direct costing. The second camp is occupied by those who oppose the principles of direct costing. The third camp is occupied by those who recognize some advantage to be obtained from each view of accounting and propose to take the best from both. These people recognize the full meaning of what has become almost a cliche in the language of accounting—"different costs for different purposes." They contend (and I believe) that we do not have to throw away all the good things we already have in order to take advantage of direct costing. You can have your cake and eat it too.

When it comes to using direct costing for profit measurement purposes, the advantages are several. In the first place, the division of accounts in terms of responsibilities is maintained and related to the responsibilities of individuals in such a way that profits which are the result of short-range decisions are classified together while those which are the result of long-range decisions—that is, the fixed costs—are also classed or grouped together for long-range measurement of the decisions of certain people. Exhibits 1 and 2 illustrate this. The financial statements, under a direct costing approach, start with the variable revenues and costs and end with the fixed cost. With this type of a report, one can tell how effectively the current management is doing in contributing toward the making of profits under the conditions which exist as a result of the long-range decisions which have been made in the past.

Moreover, it is easier to see, with a direct costing report of earnings, how

much volume must be obtained in order to cover the fixed costs of the business. In other words, it is fairly easy to compute in a crude way the break-even point for the company, simply by using the report of earnings prepared in this fashion. Furthermore, some of the disadvantages of the traditional financial statements are avoided. Although Exhibit 1 gives an exaggerated example of the results of traditional financial reporting, the disadvantages of combining fixed and variable costs in the manufacturing process are apparent when it comes to measuring profits, particularly when contrasted with the direct costing report.

However, it is in this area of accounting theory and philosophy that direct costing does violence to traditional and orthodox accounting thinking. The classical theory of profit measurement requires that all the costs of a factory be accumulated and filtered down through accounts in such a way that they become assigned to products. Direct costing, if carried into this field of accounting, results in a lowered valuation of inventories as a result of the exclusion from product costs of the fixed factory costs. In this connection, there are clearly two opposing philosophical schools of thought with regard to whether or not fixed costs are actually product costs. In my view, it is impossible to solve the question of inventory valuation satisfactory and once and for all on philosophic grounds. Philosophy is an area for the theorists. The practical businessman asks a further question. He wants to know, "What purpose am I thinking about when I express a desire to have product costs include or exclude fixed factory overhead costs?"

If the lower inventory valuation enables him to understand more clearly how much it costs for him to make versus how much it costs for him to be able or prepared to make the product, it has merit for his purposes. Also, if the lower cost gives him what he considers to be a better basis for appraising the desirability of making or not making the product to sell within the competitive price structure which exists, then that lowered inventory value suits his needs well. Still further, if he prefers a lower inventory valuation for the purposes of reflecting conservatism, this is the right valuation for his products.

On the other hand, the same businessman might wish to use total costs for his inventory in order to know how much of the fixed overhead his manufacturing has absorbed. He may wish each product to have the closest approximation of total cost which it is possible for accounting to provide. He may feel that total costs provide a better basis for knowing what products to make and sell within the competitive price structure existing at the moment.

Or the administrator may wish to have both the total and the direct costs for inventories in the belief that, by being able to look at each of the objectives from a different angle, he will be better able to make a decision.

Cost accounting is pragmatic. We must recognize that our primary objective is to satisfy the need for information which will assist management in making good decisions with regard to the future. Anyone who says that direct costs for inventory valuation purposes are better than total costs for those purposes should immediately be asked to explain the basic fundamental reason which lies behind his conclusion. We are constantly telling ourselves that in accounting you need different costs for different purposes. We deny this if we contend that there is a blanket treatment in inventory valuation which can satisfy all needs. There are good reasons, i.e., useful to management, for wanting direct costs of inventories isolated, just as there are good reasons for wanting total costs for inventories identified.

Direct Costing for Economic Analyses and Pricing

As a general rule, special analyses which are made for the purpose of narrowing the limits of guesswork with respect to some prospective course of action are more powerful if they lay bare the elements of cost and provide an insight into their probable behavior under various assumed conditions. In this regard, direct costing generally meets the needs of the problem more effectively than does orthodox costing, since it provides a picture of cost behavior patterns. Further information is likely to require even more thorough analyses. Occasionally, the total of product cost is all that is needed for particular analyses. More often, though, the elements of product cost must be known. Direct costing clearly serves most effectively in all those latter cases. Obviously, of course, the type of problem determines the type of costs needed.

When it comes to pricing, the really alert and progressive manager wants to know what additional costs he will suffer if he chooses to—and is able to—increase his output. The illustration in Exhibit 3 shows a direct costing approach to the study of the relative strength of different units or lines in the product family. The type of analysis which is typified in this exhibit has been proved over and over again to be a most effective indicator of profit opportunities, given a structure of prices over which the individual company exercises only minor influence.

That total product costs are useful also is indisputable. They give a long-range picture which represents the "other side of the coin." One may not be able to act with regard to many of the costs which are included in total product costs, but one can certainly read the danger signals from such an indicator or, on the other hand, see the results of good profit decisions made in the past.

To see the immediate effects of prices, direct costs probably offer the clear-

DIRECT COSTING APPROACH TO DIVISION DEPARTMENT OR PRODUCT STRENGTH

	Division	Department	Product A	Product B	Product C
Sales	$5,000	$1,000	$500	$300	$200
Direct costs	2,000	450	220	150	80
Percent to sales	40%	45%	44%	50%	40%
Departmental gross margin	$3,000	$ 550	$280	$150	$120
Fixed costs	1,400	350			
Departmental net margin	1,600	$ 200			
Other fixed costs	1,100				
Operating profit	$ 500				

EXHIBIT 3

est picture, but to know the long-run effect of general price levels on profits for a given enterprise, total costs are clearly the best. Nevertheless, direct costing emphasizes more clearly than before, when applied to pricing, the necessity for remembering that pricing is an art and not a science and that the buyer may and often does influence prices to a greater extent than does the company which makes the product. Somehow, these facts have become obscured for many people.

An Individual and Company Choice

Let us remember that the method which serves best the needs of the particular management of a particular company is the best method for it to use. Since managements differ from company to company and since the circumstances differ in each case, there can, as said earlier, be no magic answer as to right or wrong in basic accounting methods. Each view has its appeal to different people under different circumstances. Both or many different views may be desired by any one particular management group or individual. The objective is to improve management decisions by using business data to disclose those facts which will be most helpful in directing decisions toward the best solution. There can be no single tool or simple accounting philosophy which covers all possibilities adequately.

Forging the Tools of Cost Control

by ROBERT C. PERRY

Controller, New Products Division, Corning Glass Works, Corning, N. Y.

Placing on accounting management the responsibility for providing general management with the means of control action and seeing to it that these means are availed of, the author of the present article strongly emphasizes the need for a type of control program which neglects no activity of the company. He discusses seven requirements for such a program and outlines and illustrates an accompanying reporting program.

THE TREMENDOUS EXPANSION of our industrial capacity experienced in the past few years and the resulting high level of industrial activity, has now slowed down. Business is in a period of reappraisal and adjustment to a more competitive business climate. It is important that accountants, as members of the management team, recognize the fact that the buyer's market is here and that business is faced with an era of "hard sell," for it can be expected that competition will become increasingly keener and that the ability of any company to produce its wares at lower cost may well be the determining factor in deciding whether that company will maintain its position in the years ahead.

Dimensions of a Cost Control Program

It seems quite apparent that one of the most important of the determining factors is that of cost, with emphasis on cost control and cost reduction. Since I believed that to be so, I also believe that the cost accountant has a new and challenging opportunity to enhance the importance of his place on the management team. I firmly believe that industrial accountants are extremely fortunate in the opportunities that are theirs in this period of our industrial economy. We have a unique contribution to make. Our job is to create for management at all levels those devices, systems, procedures, or whatever they may be called, which are needed for the control and reduction of costs.

At the outset, we must have a mutual understanding of what we mean when we use the terms, "cost" and "control." By cost we mean "the outlay of money, time, labor, etc." The alert accountant must go to the root of costs and recognize them as the expenditure of the time of people, the value of raw materials, parts, accessories, machines, heat, light and power, and the value of the plant itself and all of the countless other things consumed or employed in the design, engineering, production, buying, selling, distribution, and accounting for our wares. He must learn to talk in terms used by the individuals responsible for

HOURLY PRODUCTION RECORD

Shift and hour	Pieces made		Actual shrinkage	Pieces selected		Downtime	Notes
	Actual	Standard		Actual	Standard		
1st shift - 8-9	149	150	12	137	140		
9-10	152	150	12	140	140		
10-11	155	150	13	142	140		
11-12	154	150	9	145	140		
2nd shift - 5-6	137	150	7	130	140		
6-7	145	150	5	140	140		
7-8	90	185	10	80	185	20 min.	Job change
8-9	188	185	7	181	185		

Notice that each shift can readily see how it is doing and, since it may be on a group basis or incentive plan, its members know when their earnings are being affected. Controls of this type may also generate healthy competition between other teams on the same shift or between shifts.

EXHIBIT 1

the activities, as well as in dollars. And by "control," we mean "to exercise directing, guiding, or restraining power over" and also "to keep within limits."

Cost controls thus become those cost records, reports, and other devices or means by which today's management guides, regulates, and keeps within control the operation of its business. Although the exercise of control is the responsibility of many individuals in an organization, the responsibility for fashioning the tools of control rests primarily on the accountant. If he is to meet that responsibility he must have a clear understanding of some very broad matters. He must understand, no less, what is involved in achieving management control. In a speech entitled "Management Control Through Cost Accounting" C. Oliver Wellington has this to say on the subject: "The exercise of control involves the procedure of measuring actual results against some idea, plan, past performance, or standard." He further states: "Management exercises control by direct personal supervision or by indirect supervision through the means of an organization." He thus points out the responsibility of the accountant in designing tools for the use of management. The accountant has a still further responsibility to see that they are, in fact, used. All too frequently, it has been assumed, even by some accountants, that the accountant's job has been done when a series of reports, analyses, and comparisons have been prepared, but it is clear that these tools are next to useless unless they result in action on the part of those who can do something about the situation the reports have brought to light.

In the introductory comments which have been given, I have briefly portrayed the broad fundamentals of cost control as it pertains to the accountant. Let us now consider some of the more specific yet basic principles or requirements governing the application of cost controls. In my opinion these are:

1. An adequate accounting program.
2. A comprehensive company budget program.
3. Standard costs.
4. A system of communication.
5. Assured accuracy of basic data.
6. A system of variance analysis.
7. Cooperation of all levels of management.

Requirements: Adequate Accounting, Budgeting, and Standards

First of all, the accounting program must be a complete program, tailored to meet the needs of all of the company's operations. An all too prevalent belief is that the cost accounting program is merely a supplement to the financial accounting operation. This, it is not. Rather, it is an integrated, inseparable, and essential part of the whole accounting program for the company. In order to qualify as a complete accounting program, it must account for every type of activity. A few principal ones are:

1. Financial management of the company.
2. Manufacturing operations.
3. Selling, warehousing, and distribution operations.
4. General company administrative functions.
5. Industrial and public relations functions.
6. Research and development functions.
7. Product and process engineering functions.
8. Any and all other activity carried on within the company.

The second item on our list is a company budget program. Basic to all good accounting programs and essential for cost control is an adequate chart of accounts and a system of budgets, covering the two basic areas in business, financial control and operations control. The budgets for financial control are usually the cash budget, capital expenditures budget, inventory budget, and profit and loss budget summary. These are necessary to a complete budget program but are not as directly involved in our discussion as are the budgets used for operations control. The usual budgets in the latter area are the sales budget, manufacturing expense budget, materials or purchasing budget, labor budget, distribution expense budget, administrative expense budget, and the research and development expense budget. Taken together, these are the usual parts of a company budget program.

Another word in regard to budgets: they should be set up to cover a period of at least one year in time. Many of them, such as the operating and financial budgets, should be calculated and reported on both a period basis and a year-to-date basis. Others, such as production, sales, and in some cases purchasing budgets, should be calculated and reported on both a period and a weekly basis and, in some instances, even on a daily basis. The usual practice is to prepare the profit and loss budget on both a year-to-date and a monthly or period basis. Many companies, however, enjoy much more effective control by setting up a weekly profit and loss budget for their operations as a whole and for each significant sub-division of operations. Examples are weekly budgets for manufacturing departments, major product lines, and company divisions, etc.

Standard costs form the next requirement to be commented upon. A fundamental requirement of any good accounting program and, in the opinion of

DAILY PRODUCTION REPORT

Factory Production Schedule

To: _____

Date: _____ Dept: _____ Foreman. _____

Operator	Equipment	Article Code	Article	Standard Sel. hr.	% Sel.
Wilde	SL	2691	#7 - B Unit	1584	88
Smith	SL-1	2784	#6 - C Unit	1120	83
Perks	SL-1	3223	A-J Assembly	1026	90

Production and Cost Analysis

Dept: _____

Operator	Sch. Hrs.	Down Time	Made or Possible	Selected Pieces	From. % Poss.	Time Cost Poss. Hrs.	Std. Hrs.
Wilde	8.0	0.1	15,552	13,940	90	7.2	8.6
Smith	8.0	0.5	12,528	8,120	65	5.2	7.3
Perks	8.0	-	9,120	8,794	98	7.8	8.7

Operator	Std. /Pc.	Labor Actual	Cost Std.	Rejects	%	Reason for downtime or or rejects
Wilde	.00259	31.92	36.	1,167	7.5	Spindle break
Smith	.00375	33.56	30	2 670	21 3	Unseasoned stock
Perks	.00399	32.76	36	18	2	-

EXHIBIT 2

most accountants, one absolutely essential to any program of budgeting and cost control is a standard cost system based upon sound and scientifically established standards. Moreover, adequate control of a company's activities is not achieved by comparing standard costs with the actual costs of the manufacturing processes or operations only. Standards of a type tailored to meet the individual situations, are a most valuable tool in achieving a more complete and company-wide system of cost control when they are applied to selling expense, salesmen's activities, office procedures, and clerical work and, to a degree, when applied to such outlays as those involved in research and development programs.

Requirements: Communications, Basic Data, Variance Analysis

Another basic requirement of a cost control program is a system of communications between the cost accountants and each of those individuals (at whatever level in the organization they may be functioning) who are in a position to exercise control over costs. The responsibility for establishing such a system of communication is primarily the accountant's. He must initiate it, improve and perfect the techniques of operating it, sell it to the people who can us it effectively, and keep it working smoothly. In this connection, there are two major lines of communication which must be used.

Much has been written on the subject of the formal communication and reference to some examples of this type of communication will, as has been

indicated, be made later. The second type, or the personal communication, is one of increasing importance to management of companies developing an effective cost control program. Here the accountant has unlimited opportunity to do an outstanding job in the training of members of the cost control team. The core of a personal communications system is a well defined program of meetings between the manufacturing and other operating personnel and the accounting people. There is no set pattern for these meetings. In some instances, a large group may be present. In other situations, it may be desirable that the group be rather limited in size. In many instances, the best results have been achieved by a series of meetings between just two people, the foreman or supervisor and the accountant.

Fifth on our list and an absolute requirement is that the entire accounting program be operated on a system of compiling and reporting accurate basic accounting data. The effectiveness of the tools for cost control depend directly on the accuracy of this data. Accuracy is not achieved by a system of records and controls alone. These are important but they are by no means enough. Physical control over the manufacturing operations, stores, work-in-process, raw materials, parts and accessories must be secured at an economical cost. It has been stated again and again, and it should be repeated here, that the reports, analyses, and even the financial records of a company are no better than the accumulated basic data permit them to be. However, when we speak of accuracy in the basic data for accounting and other purposes, we mean substantial accuracy—not absolute accuracy. Substantial accuracy means the exclusion of all significant errors and the inclusion of only significant detail.

With regard to variance analysis, so much has been written on it that it would be superfluous to dwell at length on the subject in this paper. It must be emphasized, however, that this, too, is a fundamental requirement of an effective cost control program. The system or formulas of variance analysis must be aimed at the reduction of costs and the increase of profits. To achieve their maximum usefulness, it is important that every controllable activity of the company's operations be fitted with the type of variance analysis best suited for each. Included in the variance analyses in common use are these: sales volume variance, sales price mix variance, sales type variance, manufacturing volume variance, manufacturing cost variance, and selling and administrative expense variance.

Co-operation: *The Fundamental Requirement*

Our seventh and last requirement is highly significant. Perhaps it is the underlying requirement or principle. At least, it is generally agreed upon by

WEEKLY OPERATIONS REPORT
Week Ending 1 - 19 - 54

PLANT: Temple — Department or Product Line: _____ — B-C Cages

	This week		Period to date	
	Actual	Budget	Actual	Budget
Direct labor	$2,780	$2,600	$5,600	$5,200
Departmental expenses	1,150	1,200	2,450	2,400
Sub-total	3,930	3,800	8,055	7,600
G. F. O. Prime	1,200	1,250	2,300	2,500
Accessories	1,650	1,600	3,200	3,300
Sub-total	6,780	6,650	13,550	13,400
G. F. O. Secondary	940	960	1,740	1,920
Direct materials	2,150	2,050	4,400	4,100
Total cost	$9,870	$9,660	$19,490	$19,420
Value of receipts to stock	$9,400	$9,550	$18,500	$19,100
New shipments - standard value	8,200	8,000	20,000	18,000
Net shipments - sales value	14,100	11,800	30,000	27,000
Estimated gross margin	5,900	3,800	10,000	9,000

Comments: Unusual advance orders produced sales over budget. Direct labor up and materials up because of defective materials.

To: Plant manager. CC: Division manager, Production manager. From: Plant accountant. Date: _____

EXHIBIT 3

many as the foundation upon which our accounting, budgeting, standard cost, and control programs are built. It is the principle of cooperation. The setting of a budget and a standard should always be the result of cooperative effort between the person whose budget is being set and the accountant. This cooperation should include mutual agreement and understanding of the report form and content to be used in presenting cost and production performance data, not only to the individual supervisor but to those at the next higher level of management who will pass judgment on his performance. Further, the need for cooperation does not end when the budgets, standards, and report form and content have been agreed upon. The accountant must be conscious at all times of his responsibility for ferreting out and discussing with the supervisor any unusual item of expense or out-of-line figure on the departmental report. Having discovered such variations, the accountant must work with the supervisor in finding the proper explanation of it.

It has been demonstrated many times that, when this type of cooperation exists, the accountant makes not only a friend but a very strong and helpful team-mate on the cost control team, one who is more than willing to make a two-way street of this exchange of information and cooperation.

Control Reports — Hourly, Daily, Weekly, and Monthly

Control reports should be designed for every level of management and for every significant operation or group of operations. The following types of control reports are illustrative of those found currently in common use; although there are many other operations or functions not included, for which many companies have need for control reports:

1. **Reports for production department supervisors.**
2. **Weekly manufacturing operations reports.**

3. Weekly operations summary reports for top management.
4. Period detail and summary reports for management.
5. Inventory budget reports.

The examples of specific reports now to be given are intended to illustrate principles and methods commonly employed in control reporting and are not necessarily adequate for all types of company activities. There are two general types of reports which may be used by production supervisors, reflecting their responsibility for the control of direct labor, direct materials, indirect labor, other materials such as parts, accessories, sub-assemblies, etc., maintenance and repairs, use of utilities, services, etc., and many other categories of expense. The first is an "at the point" control report and is presented in Exhibit 1. This type of report is used in a production team or shop consisting of hourly workers whose joint efforts are required for the production process. The report medium may be a blackboard located in the working area, with the form and headings of the report painted on the board. Every hour the record of performance is posted by a cost clerk who obtains the data as a by-product of processing basic accounting data. Control reports of this type have three features. They are simple and are produced at little cost. They are expressed in terms of what the workers are making, units of production. They are effective in keeping in front of the supervisor and the workers the record of their performance on the job.

A daily report, the second type of report useful to production supervisors, is illustrated by Exhibit 2. The content of daily control reports will be as many and varied as there are operations and activities to be controlled. There are, however, some rules that should be followed in the design, preparation, and use of these control media. Actual performance should be compared with a standard. All of the useful data available should be reported, including pertinent explanatory information. Reports should be available to supervision at the earliest possible time. A typical daily control report may include information as to the operation, shift, and product, and may show actual total and good production compared with standard, as well as shrinkage against standard and downtime and the explanation for it. Amounts may be expressed in pieces and/or dollars.

The daily report exhibited is an example of a more elaborate daily control report effectively used as a combination production schedule and production and cost analysis. It should be mentioned that daily control reports are not confined to production departments but may be applied to any element of cost where this type of control is deemed to be necessary or useful.

Effective weekly cost control reports fall into three categories: for depart-

WEEKLY REPORT OF ESTIMATED GROSS MARGIN

2 Week of Period 8, 1954 Division

	Week	Period to date	Estimate for full period	Budget for full period
Net sales	$48,910	$109,474	$240,000	$260,000
Gross margin	12,278	21,740	62,400	65,000
Gross margin %	25.1	19.9	26.0	25.0

Comments: Breakdown of testing equipment will not hold up production but will slow down shipments for 3 weeks. Will make-up sales in Period 9.

To: Controller. CC: Division manager, Production manager. From: R. J. Perkin. Date:

EXHIBIT 4

ment supervisors, higher levels of supervision, and plant management. Those for the departmental supervisory level usually consist of the daily reports summarized for the week and reports on operations and expenses which can be controlled on a weekly basis, compared with a standard. Weekly reports for higher levels of supervision include summary production and cost reports for use at the management levels above the department supervisor. Reports aimed at this level of management must be concise yet brief. They must also be both statistical and explanatory in nature. Weekly profit and loss reports prepared in simple form for division and plant managers (directed also, perhaps, to production and departmental supervisors) may cover departmental operation or major product classifications. Exhibit 3 is a typical example of a report of this type. Weekly profit and loss reports are becoming more and more prevalent in business, because they have been found to be an increasingly more effective tool in the control of costs.

For company management—as distinguished from division, plant, or department—condensed reports are required and are most effective. These may be presented in either statistical or graph form or both. Since graphs or charts are not universally acceptable among top management personnel, the accountant should be sure that the control data is in the form best suited to the individual for whom it is intended. Exhibit 4 is a typical report of this sort, prepared for use in the same company as Exhibit 3. Two features of this exhibit may be particularly noted. First, only a few figures appear on it, but those few figures concisely state how much business was done and how much profit was made for the current week and the period to date. It also gives a forecast for the full period and a period budget for comparison. Second, there is liberal provision of space for comments. When operations are not meeting expectations or when they are appreciably exceeding expectations, the reasons for the deviation must be clearly and simply given in this space. This furnishes top management with extremely useful control information.

MONTHLY (OR OTHER ACCOUNTING) PERIOD
REPORT OF BUDGET RESULTS

PLANT: Bucktown DEPT: Framing DATE ISSUED: 9-20-53 PERIOD: 8 - 1954

Item of expense	This period			Year to date		
	Actual	Budget	Variance	Actual	Budget	Variance
Cutting-direct labor	$2,780	$2,600	$180 L	$21,780	$21,500	$280 L
Sawing-Direct labor	4,230	4,300	70 G	35,450	36,500	1,050 G
Planing-Direct labor	1,850	1,850	20 L	19,770	19,550	220 L
TOTAL DIRECT LABOR	$8,860	$8,730	$130 L	$77,000	$77,550	$550 L
Indirect labor	980	990	10 G	7,700	7,800	100 G
Supervision	560	560	-	4,500	4,600	100 G
Dept. Misc. expenses Etc.	1,240	1,200	40 L	9,500	9,320	180 L
TOTAL DEPT. EXPENSES	$15,750	$14,980	$770 L	$125,490	$124,940	$550 L

Comments: Excess breakage in raw stock resulted in excess labor in the Cutting and Planing Depts. Pieces rejected were 2% in excess of standard.

EXHIBIT 5

Detail expense reports for a month or other period are of value to the production supervisor in that they summarize for him on a period and year-to-date basis those elements of cost which have been reported to him on a daily or weekly basis. In addition, they give him a statement of his expenses for items not reported in detail on the more frequent reports. Such a report is exemplified in Exhibit 5. As was pointed out before, the analysis and explanation of the period figures can be more easily and intelligently prepared and used when the supervisor has been furnished weekly and daily controls reports. There can be as many monthly (or other period) reports at the plant level, as are needed to cover the departments or cost centers in use. For management at and above the plant level, a summary report should be prepared. For each higher level in management, these reports are usually further condensed.

Distribution of these various types of manufacturing operating reports to management is portrayed in Exhibit 6, in line with indications already given in connection with description of these reports. This particular distribution reflects the practice of one company and might vary in others, but it may serve as a comprehensive example.

Inventory Budget Reports — and Other Areas for Control

Special mention may be made of inventory budget reports, which are not nearly as widely used in industry as they should be. Many companies, however, do require the preparation of an inventory budget as a supplement to the period operations budget of each plant. Typical information shown on such a report would cover actual and budget dollars for finished goods by class of product or item, ware-in-process, raw materials, purchased parts, accessories, supplies-operating, supplies-maintenance, and packing materials, etc. Other useful data

DISTRIBUTION OF COST CONTROL REPORTS

Item or class of expense by dept.	Reports for use of dept. supervisor and plant manager	Reports for use of division mgr.	Reports for top management
Direct labor			
Cutting	X		
Trimming	X		
Finishing	X		
Total Direct Labor	X	X	
Indirect Labor			
Supervision	X		
Total Indirect Labor	X	X	
Department expenses			
Small tools	X		
Supplies	X		
Repairs	X		
Paints	X		
Lacquers	X		
Utilities and services	X		
Total Department Expenses	X	X	
Raw materials			
Material A	X		
Material B	X		
Material C	X		
Total Materials	X	X	
Total Manufacturing Expense	X	X	X (For all departments in the plant.)
Units of Production	X	X	X " "
Cost per unit	X	X	X " "

EXHIBIT 6

shown on many inventory reports include cumulative net sales for the period- and year-to-date showing both actual and budget figures by class of product or item, the sales forecast for the next three periods compared to the original sales estimate for these periods, and annual sales forecast—new estimate for the current year and prior estimate for the current year.

Although an inventory budget report of this type does not, of itself, reduce the amount of capital tied up in inventories, it is a control tool which, when applied with proper vigor by management, can do much to achieve better inventory control. It is interesting to note that, when this type of control report is used, the need for the calculation of inventory turnover ratios and the reliance on turnover ratios as the only control tool, is greatly reduced.

The alert accountant is now applying cost controls to many other areas of expense. Heretofore some of these areas were considered to be too difficult or in a portion of operations too sacred to be invaded. Among the long neglected areas are the following:

1. Selling and distribution expense
2. Product engineering expense
3. Research and development expense
4. Industrial and public relations expense
5. Administrative operations

The Main Point

We should focus our attention on the primary purpose of cost control. It is aimed directly at a clearly defined target, namely, cost reduction, and the bullseye of that target is profits. However, there should be no doubt or confusion in the accountants' thinking about cost reduction. All too frequently, it is erroneously considered to be synonymous with cost cutting. This is not so.

The accountant should recognize that cost control is a joint and cooperative enterprise and that the more people in management and more workers in the firm who are brought into participation, the more effective will be the cost control program. It should not be an impulsive or an inadequately planned program. An analysis of program failures would show that the major reason why cost control programs have failed is that dramatic results were expected too quickly and discouragement was, therefore, permitted to rise much too early in the game.

Those who would seriously undertake a cost control program must recognize many things. Among the important and basic facts that must be recognized are these:

1. It is a long-range program.
2. It must be carefully planned and put into operation step-by-step.
3. It must be constantly reviewed and improved and revised to meet changing conditions.
4. It must be flexible. Other than the basic principles, there should be no rigid rules employed to govern the program. The program should be adjusted to meet changing conditions.
5. It must be sold to every member of the management team.

Cost control is a continuing and never-ending task. The application of cost controls is an hourly, daily, and weekly job, as well as one for the usual accounting periods. It is the challenging job of the cost accountant to develop the cost control program, to fashion the tools for it, to be its champion and its strongest advocate. Judged in its proper perspective, the cost accountant's job is to supply effective controls so that the operation of his business may be assured of achieving its profit objective. It is a challenge which all accountants should welcome.

Useful Activity Indexes by Inventory Fractionation

LOUIS B. KAHN & WAINO W. SUOJANEN

Statistician (Operations Research), Planning and Comptroller Dept., Naval Supply Center, Oakland, Calif.

Acting Assistant Professor, School of Business Administration, University of California, Berkeley, Calif.

If a large inventory, or even a small fairly diversified one, were reduced to a mechanical representation, it might show its component items or groups of items as hundreds or thousands of wheels of all sizes (from casters to turbines) variously geared together—perhaps some not geared at all—for varying rates of turnover. The present article is principally devoted, first, to consideration of the shortcomings of any system of control which likens this agglomeration to a single wheel and, second, to a method which, with mathematical helps, will permit its control and adjustment wheel by wheel.

INVENTORY CONTROL has many ramifications not easily followed through. Whether one turns to top management or to the specialist, there is the desire to increase inventory turnover and reduce inventory investment. At the same time, it is evident that many of the presently employed measures and techniques are rather crude and cumbersome. Most commonly utilized methods are based on the assumption that inventories are homogeneous, although everyone is aware that different items of inventory do in fact have turnover ratios that vary from the very fast to the dead. One of the purposes of this paper is to develop a frame of reference for the inventory control problem and to suggest a technique, now employed by the Navy Department in the field, which can be employed by a firm where inventories constitute a sizable proportion of the current assets.

Inclusive Dollar Turnover Ratios Won't Do

Among others, the financial analyst, the credit analyst, and top management use the inventory turnover ratio as a measure of the operating efficiency of the company under consideration. The cost of goods sold or the net sales are divided by the inventory. The resulting ratio is then used to compare the performance of companies or to obtain comparability over a period of time for one company. For a number of reasons, most of them springing from the character of the development of the enterprise system in the United States, inventory turnover ratios no longer can be employed as a definitive measure of performance.

One criticism which can be made about the inventory turnover ratio is that it does not distinguish among varying proportions of raw materials, work-in-process, and finished goods in the total inventory. As the proportions of the three components of inventory vary, they tend to affect the resulting ratio. For example, the ratio will usually be lower if the proportion of work-in-process and finished goods is higher at the end of one period than at the end of the preceding period, because labor and overhead are usually included in the inventory values. As production techniques change over time and differ among companies in the same industry, the inventory turnover ratio will tend to reflect these differences.

Flowing out of the above is another shortcoming of the inventory ratio. It is evident that, if the inventory is valued on a "lifo" basis, its relation to the cost of goods sold or to net sales will not yield comparable data, especially for interfirm comparisons, when "lifo" was adopted on different dates. Beyond this, there are other shortcomings caused by inventory valuation, illustrated in the following note to the financial statements of the National Gypsum Company:

> "Inventories of products finished and in process were priced (a), as to $4,155,652 thereof, on the basis of predetermined standard or average costs, or, if lower, estimated replacement costs or net realizable amounts, and (b), as to $1,395,340 thereof, on the basis of cost (less than estimated replacement cost) determined by the last-in, first-out method. Materials and supplies were priced at the lower of cost (averaged or first-in, first-out) or replacement market." (National Gypsum Company, Annual Report, 1953.)

The above is a reminder that many large corporations use different methods for valuing the different components of inventory, so that, in addition to the "lifo" distortion, there are other discrepancies which shift dollars from inventory to cost of goods sold or vice versa.

Further, if direct costing becomes an accepted principle of inventory valuation, it will tend to compound confusion into chaos as far as the inventory turnover ratio is concerned. Even without such acceptance, where inventories of work-in-process are valued only at the raw materials and direct labor cost figures, there is a tendency to approximate the direct costing basis of inventory valuation. Also, treatment of idle capacity costs may affect turnover. If they are included in the overhead absorption rate, there is an overstatement of inventory values. Add to all this a change in the general price level (the price the company pays for its purchases) and the inventory turnover ratio becomes not only a useless, but also an uninteresting, exercise in arithmetic. (See "The Case Against Lifo as an Inventory Pricing Formula," Maurice Moonitz, *Journal of Accountancy*, June 1953.)

Another major criticism of the inventory turnover ratio, at least from the

point of view of the security or credit analyst (who does not have available the pertinent managerial data) arises from the post-war trend toward increased diversification of output on the part of many large corporations. Is it possible to make valid comparisons, either among companies or over time, when the firms being studied operate in a number of industries rather than in only one industry? It is simple enough to classify an enterprise as being in the distilled liquor industry when that is its only product line but how is it to be classified if it is also a producer of industrial chemicals? What is to be the classification of the ship building firm which also is a producer of kitchen utensils and paint or the steel producer that is edging into plastics? Or take the case of a smaller company from the annual report of which the following is quoted:

> "In the electrical field your Company is engaged in three important areas of activity, namely batteries, office equipment and instrumentation. Relative to each other, the operation in each of these areas are of approximately equal importance. In terms of sales alone these operations constitute about 90 per cent of our business. In addition your Company is engaged in two unrelated though profitable enterprises, through its Medical Gas Division and Edison Wood Products, Incorporated, a wholly-owned subsidiary." (Thomas A. Edison, Incorporated, Annual Report for the year ending December 31, 1953.)

This situation is increasingly prevalent. A study of the annual reports of listed corporations and a comparison with the pre-World War II published statements of these same companies immediately brings to a focus the increasing importance of both research and diversification in the long-range planning of American industry. Research is devoted to uncovering new products and diversifications and to exploiting them on a commercial basis. However, as diversification takes place it changes the composition of both the inventory and the cost of goods sold and net sales figures. It is true, of course, that classified inventory and cost of goods sold and net sales data are available to the management of the enterprise, but the same data are not available to the outside analyst or to the management of competing companies. Both must rely on the published statements which are a composite of the influences of all of the industries in which the corporation operates. As the number of industries in which a company sells its products increases, inventory turnover data assume a more and more heterogeneous character and tend to decrease the importance and the analytical value of ratios.

It should also be pointed out that there is as yet no commonly accepted method for the charging of research costs. As a result, inventory values are distorted in one direction or another, depending on the policies governing the accounting for research costs. In some firms research costs may be capitalized in full, in others only partly capitalized and in still others written off in total

to expense. The post-war increase in research costs makes this factor all the more important than it was prior to the war. Inventory turnover ratios are obviously affected by the accounting treatment of research costs and the lack of uniformity reflects itself in non-comparable data as among firms and between accounting periods.

Going still further, a number of other factors operate to restrict the applicability of the inventory turnover ratio. Two firms may operate in the same industry and yet may have differing ratios because one is on a calendar year and the other on a fiscal year basis. The rapidity with which management decides to write off obsolete inventory is a factor that has to be taken into account. Property and income tax considerations often affect inventory policies. The inventory valuation methods employed over a period of time or in separate companies are often different and subject to change with the passage of time. Anticipated price movements play a role. The business cycle affects both parts of the fraction so that a turnover ratio has little relevance unless the effects of business fluctuations are assessed and the necessary corrections made.

Defects of Overall Physical Turnover Ratios

But what about a turnover ratio that by-passes money amounts? In view of the many shortcomings of inventory turnover ratios based on dollar figures, a commonly employed method of obtaining the turnover of inventory is to compare the average monthly volume in units of inventory with the volume of units sold or issued. This results in a physical turnover ratio. Cost accountants and others use this ratio as a measure of operating performance. The physical turnover ratio has certain defects which do not make it very valuable as a test. In the first place, there is an assumption that all units of inventory are homogeneous, although experience tells us that this is not the case. Because of this fact, it does not provide a means of comparing the experience of one period with that of another. In other words, no standard is available against which to compare the actual performance.

Another disadvantage of the physical turnover ratio arises from the fact that the balance on hand amount fluctuates between a minimum and a maximum. The ratio improves as the minimum is approached and becomes worse when receipts increase the on-hand balance. The physical inventory turnover ratio will be affected also by the choice of the base, i.e., whether the ending balance, the beginning balance or the average inventory balance is used as a base. Seasonal fluctuations tend to aggravate these difficulties as do changes in inventory balances caused by the effects of the business cycle.

SAMPLE ELECTRONIC ACCOUNTING MACHINE RUN
SHOWING HOW INDEXES OF ACTIVITY (I_p)
ARE COMPUTED

Issues_____ Analysis_____ Class "X"

Column Headings: 1. Class 2. Stock Number 3. Unit of Issue (p = 12 month)
4. Quantity Issued (V_p) 5. No. of Issue Trans. (T_p) 6. On Hand Balance (B_c)
7. Activity Index (I_p)

1	2	3	4	5	6	
X	1101	BT	44289	1141	3547	29.434077053
X	1102	PK	80528	1472	9989	24.516733432
X	1103	BT	9757	669	1312	10.278706116
X	1104	BT	18355	1119	4480	9.471873904
X	1105	BT	90842	1309	26314	9.336190098
X	1106	BT	249674	412	100910	2.106036270
X	1107	BT	20218	378	11831	1.334562037
X	1108	BT	46532	938	104239	.865062752
X	1109	BT	1505	125	877	.443175077
X	1110	BT	22293	166	19634	.389399101
X	1111	BT	525	127	443	.310948908
X	1112	JR	6603	229	21766	.143523863
X	1113	EA	2549	89	9003	.052058406
X	1114	BX	431	76	3490	.019389905
X	1115	BX	1375	71	21050	.009581529
X	1116	BT	92	20	973	.003906806
X	1117	BT	63	17	872	.002537213
X	1118	BT	109	37	10461	000795761
X	1119	EA	1641	14	114991	.000412745
X	1120	PK	46	4	5559	000068343
X	1121	PK	24	1	1920	.000025825
X	1122	EA	2	1	759	.000005433
X	1123	EA	2	1	1398	.000002945
X	1124	BX	2	1	5726	000000702
X	1125	BT			336	.000000000

EXHIBIT 1

Formula Approach to Inventory Control in Simpler Cases

A recently published volume, (*The Theory of Inventory Management*, Thomson M. Whitin, Princeton University Press, 1953) contains a wealth of material on inventory control problems and provides theoretical and practical information to aid management in decision-making in this area. This book presents an interesting and simple theoretical formulation for computing (a) the economic purchase quantities for each raw material used by the firm, (b) the economic manufacturing lot size for each product and (c) safety allowances for finished product. Optimum ratios for raw material, work-in-process and finished goods inventories relative to total inventory are also presented. The formulas are relatively simple and can be applied without too much difficulty, to aid in the solution of the inventory problems of the firm. The author points out that some companies are already using them.

Whitin's formulas are more difficult to employ in the case of companies which do not know just what their sales of each product will be during the budget period. This, of course, is the heart of the inventory control problem. There is

usually more uncertainty as to what the sales of each product will be during the budget period than as to what total sales will be, because errors in the budgeted sales of products tend to cancel each other. As a result, inventory levels in most companies are higher than they would be if certainty prevailed as to the sales of each product. The result is an excess investment in inventories and a shortage of working capital. The search for a device to overcome this disadvantage of traditionally employed inventory control techniques has resulted in a method of inventory control that is called "operational fractionation."

The Concept of Activity Categories

But how to get at the particulars of inventory to achieve desired control? We are all aware that there are various categories of activity for the items composing an inventory. Some items move out almost immediately. Others have a slower turnover. There are items which can be considered as inactive or dead. These items must be carefully watched and analyzed, for they are the ones which increase obsolence costs and tie up working capital needlessly. Disposition of obsolete and shopworn inventory is expensive and management is concerned with keeping such stock at a minimum.

Storage control can be simplified and shortage costs reduced if dead and inactive inventory is so warehoused that it is infrequently handled and movement kept at a minimum. By the same token, the rapidly-moving items can then be stored where they are most accessible and their movement accomplished rapidly and economically. In many companies, material handling costs account for a large proportion of the difference between gross and net profit and, to the extent that inventory can be arranged in activity categories, costs are reduced and the result reflected as a higher rate of net profit.

When inventory is broken down into activity categories, periodic inventory cycles can be rearranged so that dead and inactive items will be counted less often than the rapidly moving stock. The latter categories can be counted annually, the former every two years or even less frequently. Sensitive items, no matter what their activity category, should, of course, be carefully controlled and frequently inventoried.

Operational fractionation of inventory, as we shall term the breakdown of inventory into issue-activity categories, possesses a number of advantages which should make it appeal to firms with large sums of working capital tied up in inventories. Its adoption should also reduce material handling, storage and obsolesence costs, as well as freeing working capital for other more pressing uses. An operationally fractionated stock possesses one other distinct advantage

SUMMARY OF ACTIVITY FOR SELECTED CLASSES OF MATERIAL

Average Index of Activity	Period of Study Months	Class of Material	Number of Stock Items	Percent of AVERAGE
.19950	12	Brooms, Brushes	147	2336.45
.07207	12	Stationery	1286	841.12
.04035	12	Office Equipment	112	470.79
.03673	12	Furniture	208	428.74
.01595	12	Hand Tools	3675	185.75
.01534	12	Clothing	2008	178.74
01502	12	Dry Goods	304	175.23
.008810	22	Medical and Dental Material	5579	102.92
008754	12	Lamps, conduit and tubing	3143	102.22
.008555		AVERAGE	71888	100.00
008437	12	Notions	440	98.60
.007365	6	Electronics	42606	85.98
.006427	19	Nuts & Bolts	9297	75.00
.005257	12	Metal in Bars	2210	61.33
003680	12	Special Clothing	745	42.99
.000427	13	Dry Batteries	128	4.99

EXHIBIT 2

as a decision-making device. It provides management with an index of activity for each stock item carried, such index being of use in improving the purchasing and inventory control functions. In effect, for the two-bin and ordering-cycle systems, it substitutes a series of control ratios. These can be used to classify the inventory and to provide realistic inventory balances.

The Activity Index Formula and Effective Fractionation

The issue activity for each inventory item for a given period is derived by the following formula:

$$I_p = \frac{V_p \quad T_p}{p^2 \quad B_e} \qquad p = 1, 2, 3, \ldots \text{n-months}$$

where p equals the period studied in months, V_p the total quantity issued for the period, T_p the total number of issue transaction for the period and B_e the current "on hand balance," which includes any material due or on order.

The necessary data to compute the activity index can be obtained from the perpetual inventory cards maintained by the firm. Since the period, p, is measured in months, it is possible to calculate the activity index for any desired length of time. Similarly, by dropping the earliest month and picking up the latest month, the index for any item can be computed and used to develop a trend which indicates whether issue activity is increasing or decreasing. These figures can then be used to determine future purchasing and inventory control policies for the item in question. Activity indexes can be computed using aver-

ages, for an inventory class. Reference to Exhibit 1 will illustrate how activity indexes are calculated for an item or class.

After an examination of the distribution of the indexes of Activity and after an analysis of the general activity of the individual stock items in the distribution in terms of V_p and T_p major categories can be (and were in the instance in background) selected to denote issue activity, as follows:

1. The fast-moving group represented by indexes of activity of 0.5 or over.
2. The medium-moving group represented by indexes of activity between 0.005 and 0.5.
3. The slow-moving group represented by indexes of activity between 0.0001 and 0.005.
4. The relatively-inactive group represented by indexes of activity between zero and 0.0001.
5. The inactive or dead group represented by an index of activity of zero.

After the stock items have been grouped in accordance with their indexes of activity, a check on such activity is obtained by taking the ratio of the current inventory, which is the B_e of the formula expressed in dollars, and the total quantity issued over the period, which is the V_p of the formula, also expressed in dollars. This ratio, translated into percentage, provides an indicator of dollar value of inventory turnover by comparing the level of stock on hand with the demand for the period (p) studied. Symbolically, this ratio is usually expressed as follows:

$$\text{I-V ratio} = B_e/V_p \times 100 \quad p = 1, 2, 3, \ldots \text{n-months}$$
(percent)

The factors, B_e and V_p are expressed in dollars so that I-V ratios can readily be obtained for any aggregate of stock items, showing the average status of stock item activity for any selected group. In this way, an indicator of aggregate inventory activity is easily computed which shows by an index such activity for a complete type of class of material. It would be quite difficult to obtain such an indicator through the use of the first formula, since varying type of material, issued in various units of issue, preclude the use of a quantity and transaction approach.

However, it is possible to statistically calculate an arithmetic average of stock item activity indexes, by the use of a logarithmic distribution, which shows the average activity for a given class of material. These overall averages for each of the classes can then be used as a basis for comparing the activity between classes in terms of inventory turnover, transaction and quantity-wise. Exhibit 2 shows such a comparison for selected classes of material.

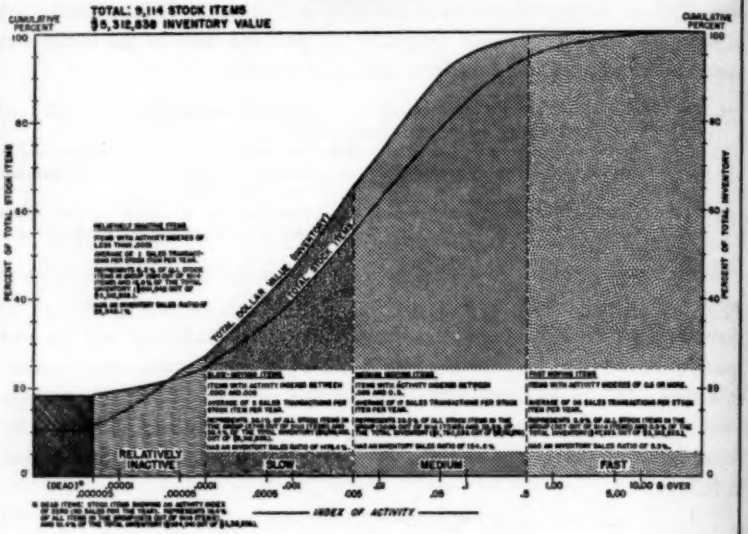
Exhibit 3 shows an operational fractionation of 9114 selected stock items for the fiscal year 1953, with an inventory value of $5,312,838. The cumulative distribution curves for stock item and inventory value are charted from the

OPERATIONAL FRACTIONATION

RANKING OF STOCK ITEMS

BY INDEXES OF ACTIVITY

FISCAL YEAR 1953



DATA FOR PLOTTING OF CURVES

Indexes of Activity	No. of Items	Percent	Cum Percent	Inventory Value	Percent	Cum Percent
10.000000 and over	36	.39	100.00	$ 355	.01	100.00
5.000000 - 10.000000	58	.64	99.61	1,093	.02	99.99
1.000000 - 5.000000	232	2.54	98.97	23,370	.44	99.97
.500000 - 1.000000	201	2.21	96.43	22,735	.43	99.53
TOTAL FAST	527	5.78		47,553	90	
.100000 - .500000	867	9.51	94.22	222,935	4.20	99.10
.050000 - .100000	535	5.87	84.71	213,352	4.01	94.90
.010000 - .050000	1506	16.53	78.84	959,626	18.06	90.89
.050000 - .010000	691	7.58	62.31	384,386	7.24	72.83
TOTAL MEDIUM	3599	39.49		$1,780,299	33.51	
.010000 - .005000	1376	15.10	54.73	1,000,375	18.53	65.59
.005000 - .001000	489	5.36	39.63	329,923	6.21	46.76
.001000 - .000500	883	9.69	43.27	708,105	13.33	40.55
TOTAL SLOW	2748	30.15		$2,038,403	38.37	
.000050 - .000100	208	2.28	24.58	173,562	3.27	27.22
.000010 - .000050	282	3.09	22.30	523,776	9.86	23.95
.000005 - .000010	46	.51	19.21	134,493	2.53	14.09
.000001 - .000005	25	.28	18.70	55,975	1.05	11.56
.000001 and under	3	.03	18.42	3,836	.07	10.51
TOTAL RELATIVELY-INACTIVE	564	6.19		$ 891,642	16.78	
TOTAL "DEAD"	1676	18.39	18.39	$ 554,941	10.44	10.44
TOTAL	9114			$5,312,838		

EXHIBIT 3

percentages given below the table for each of the activity categories. Thus, a picture of the aggregated stock items according to increasing activity, and the dollar value of inventory involved for such aggregation, is easily read from the chart. In this way, it is possible to determine at a glance how many items, and the total inventory value of such items currently stocked, are involved for any designated point of activity. Similarly, the chart provides a continuous cumulative distribution function which gives an insight into the probability that an index of activity for a chance item is less than or equal to any particular value which may be selected.

A More Discerning Technique

The operational fractionation of the inventory provides a much more realistic method for evaluating the turnover of the inventory than does the commonly used sales-inventory turnover ratio. The indexes of activity calculated in operationally fractionating an inventory are mechanically derived indicators of stock item activity and turnover which have the additional advantage of presenting in a simplified form to top management the performance of a company relative to a given standard revealed in its inventory. It also provides management with a technique which aids in reducing the inventory by eliminating obsolete items, reducing the stock levels of slow-moving items, and purchasing on the basis of scientifically derived patterns of stock item activity, as well as reducing operating costs by improving storage and material handling procedures.

The technique of operationally fractionating the inventory has been developed, tested for its feasibility, and found to be a valuable tool in evaluating the activity of the stock at a large naval supply activity, with consequent economies in the storage and handling of material. The adoption and implementation of operational fractionation is relatively simple, lending itself easily to mechanized inventory control, and yet is a system which will result in numerous benefits to companies deciding to put it into practice. By focusing on real inventory needs, it reduces much of the uncertainty which now surrounds the area of inventory control and management.

Capsule Cases In Statistical Cost Control

by LAWRENCE L. VANCE

Professor of Accounting, University of California, Berkeley, Calif.

Taking—not mistaking—the part for the whole is the mission of statistical sampling and its use in this era of facts and acts in volume (many times that which obtained when Edmund Burke turned modern times over to the "calculators" and other hard-minded folk) is receiving ever-wider application. Several articles have already developed a relationship between sampling and cost control. This paper, besides covering theoretical ground, renders the relationship concrete through recital of four cases told in a fair degree of circumstantial detail.

THIS PAPER DEALS with applications of statistical theory as a cost control device. It uses the term, cost control, in a broad sense. Cost control is more than a cost accounting system. It involves other devices and, of course, it involves executive action. Here, we shall first consider the nature of statistical sampling theory. We shall then notice some applications of the theory in industrial uses, not matters of cost accounting in a strict sense but clearly a matter of cost control in a broad sense. Finally, we shall notice the possibility of using the theory in cost accounting procedure.

Sampling and Its Reliance on Probability Theory

Sampling is simply the selection of a part to represent the whole. Sampling theory is used to make useful generalizations about a large amount of possible data when only a smaller amount of data are available. Sampling theory is based upon the mathematics of probability. It answers such questions as, Can we accept this lot as up to standard? What is the average size of the items in this shipment? How many items must be in the sample before we can rely on it with a given degree of confidence? and Is there a significant difference between lots A and B?

Sampling serves two basic purposes: (1) It provides an estimate of some characteristic of the population, or (2) it permits a decision to be made about the population. For example, we may wish to know the percentage of copper ore in a deposit. We can estimate it from a sample or samples. Or we may want to know whether or not to accept a shipment of dynamite caps as containing not more than ½ of 1 per cent duds. We can decide by a sample.

Sampling per se must be almost as old as human thought, since we must so often be satisfied with information about a part when we really want to know

about the whole universe or population. For example, when we decide whether or not to use a spring as a domestic water supply, we really would like to know the purity of all the water flowing and still to flow through it during the time we shall use it. We settle for a sample, perhaps a periodic one. However, the traditional sampling process based upon judgment bears only an elementary resemblance to the sampling theory of modern statistics.

Sampling based upon the mathematics of probability permits us to estimate in advance the degree of accuracy of the sample and to test the degree of accuracy in retrospect. As a corollary, we can determine the number of items which must be in the sample to achieve the results desired. This means that we can balance the cost of the sampling against the value of the results to be obtained. It means also that we know the range within which our estimates fall or the degree of risk we take in making a decision. In the case of the dynamite caps, for instance, we may decide to take a sufficiently large sample so that we will conclude they are likely to be up to standard (when they are not) only 3 per cent of the time. If we wish, we can also set the risk of making an error in the opposite direction where we want it, i.e., the risk of rejecting a shipment as under standard when in fact it is up to standard.

Some intuitive idea of the validity of these statements may be gained from a brief look at probability calculations. The idea of probability is familiar to all. A classic, simple, illustration is the probability of getting heads in tossing a coin. It is $\frac{1}{2}$, or 1 in 2. When we attempt more elaborate probability calculations, we need more mathematics. For example, in calculating the probability of drawing a certain bridge hand, we need the formulas for combinations. This is high school algebra and it is sufficient for many industrial applications. Some probability calculations require considerably more complex operations and are best attempted with an electronic computer. However, the basic idea is simple: a probability is simply the ratio of certain events to all possible events in a series or set. Thus, if we draw a card from a bridge deck, the probability of getting an ace or deuce is $\frac{8}{52}$ or $\frac{2}{13}$. To a large degree no calculations of probability need be made in routine work because published tables exist.

The role of probability in statistical sampling theory is perhaps most easily seen in the decision making process. We set up an hypothesis, or assumption, about the population. This may be only a standard to which we wish to adhere or it may be based on specific information about the population, or both. For example, we may know the manufacturer and his methods. In the case of the dynamite caps, we set up the hypothesis that the shipment was not more than $\frac{1}{2}$ or 1 per cent defective. We then draw our sample and, by tables or otherwise, calculate the probability that such a sample would be drawn from a

population not more than ½ of 1 per cent defective. If the sample has so many defectives that it could come from the specified population only once in 1,000 trials, we would not believe that the actual shipment was as good as the standard. But if the number of defectives in the sample corresponded with what we would get in sampling the specified population, say, 80 per cent or more of the time, we would find nothing in the sample to deny our assumption about the shipment, and we would accept it. Actually we would use tables which indicated "accept" and "reject" without explicitly giving us a probability figure, but the probability desired would be reflected in the table.

The foregoing discussion is necessarily very sketchy and relies upon the reader's intuition, but the fundamental ideas are sound. It is, nevertheless, true that the field of statistical sampling theory is both large and complex and the services of a specialist are usually needed if one is to embark upon an industrial application successfully. One easy example of this is the usual need to draw the sample at random. This is a familiar idea, but the means of achieving it are sometimes elusive. The problem is slippery enough so that statisticians have developed tables of random sampling numbers which can assure that items are drawn at random from a given population. The body of this paper will describe four cases which illustrate the usefulness of statistical sampling theory in industry.

The Case of the Telephone Equipment

Accountants usually think of any inventorying operation as a clerical performance either with a physical count of the items or a tabulation of some sort of perpetual inventory records. The Chesapeake and Potomac Telephone Company of Baltimore City has applied statistical sampling to this process. (Reported by Magruder, E.T., in *Sample Design — Reconciliation of Continuing Property Records: Stolen Apparatus Account,* Chesapeake and Potomac Telephone Company of Baltimore City, 1950). The company needs periodically to know the distribution of telephones by type of apparatus, there being six types. The plant department keeps records showing the type of apparatus at each customer location. A complete tabulation of these records could be made, but the sampling procedure is quicker and cheaper and substantially as accurate. In this case a stratified sample, which requires division of the population into more or less homogeneous strata, was used. Stratification usually permits more accuracy and economy in getting sample estimates. The three strata employed were dial offices, nondial offices and private branch exchanges.

This company has also used statistical sampling techniques in other account-

ing situations. Examples include a distribution of disconnected equipment by age bands, an audit of the classification of troubles reported by subscribers, and a segregation of the book cost of outside plant according to its usage for local, state or interstate business. In the case of the last application, the survey cost about 10 per cent of the amount a full tabulation would have cost and had a margin of uncertainty of 1.6 per cent on a ninety-five per cent probability basis. In other words, there was only one chance in 20 that the estimate would be off more than 1.6 per cent. Actually, sample results of this sort are often more accurate than a complete tabulation, because large tabulations involve much tedious routine work which results in many errors, and often require the use of less capable and less well-trained help. The restricted work done in a well-designed sample can be performed much more carefully by much better trained workers. This, combined with the opportunity to control the degree of sampling error (resulting from getting a very unusual sample) gives sampling an accuracy not suspected by the layman.

The Case of Inter-Line Freight Receipts

The railroads have a large clerical accounting problem in dividing freight receipts among cooperating roads on an inter-line haul. The Chesapeake and Ohio Railroad has experimented with the substitution of statistical sampling for the complete calculation. (Reported in "Can Scientific Sampling Techniques be Used in Railroad Accounting," *Railway Age*, June 9, 1952, pp. 61-64). A six month period was selected and the 23,000 waybills involving this railroad and one cooperating line were used. Here again, a stratified sample was used, the strata being dollar-size classes. All the waybills over $40 were included in the sample and a total sample of 2,000 was designed. The sample items were examined and the amount due the railroad estimated from the sample by the methods of mathematical statistics. In order to check the results, the waybills were put through the regular clerical process of calculation in which the amount due on each waybill is computed. The results were only about $80 different in an approximately $65,000 total. Inasmuch as it cost $5,000 to make the detail calculation and $1,000 to make the sample estimate, the economy appeared justified. Any error due to sampling would pretty well be cancelled out over a period of time in a case of this sort.

The Case of the Floor Stock Inventory

The case next to be offered concerns a procedure adopted in a San Francisco department store to improve the physical inventory taking. (Reported by

Brinegar, Claude S., "The Application of Quality Control to Physical Inventory," *Papers and Proceedings of the 13th Annual Convention of the Controller's Congress,* Western States Regional Group, Berkeley, California, August 21-24, 1951, pp. 236-250.) The inventory involved was the floor stock, which posed a special problem because it was not convenient to have it tied up by the counting activity for more than a few hours. Counting was done by two-man teams, one individual counting and calling and one recording, with a complete check of the count almost doubling the cost. A statistical sampling scheme was developed to supplant this 100 per cent check. Here we have an internal auditing application of statistical sampling but one applied as a part of the operation rather than as a review made later.

The records of the complete rechecks made in prior years were of considerable help in designing the sampling procedure for sampling schemes, as one might expect, are improved by any valid foreknowledge of the process or population to be sampled. In this case, the past inventory sheets gave a record of the percentage of errors in the original count. An analysis of these sheets (some 3,000) indicated that most errors were small (over or under 1 in the count, $1.00 off in price, or wrong season letter) that different types of goods varied greatly in their susceptibility to error, and that a few inventory teams were responsible for most of the errors.

The sampling scheme adopted provided different standards for different sections of the work, according to the needs indicated in the preliminary analysis. In a few cases, where the errors were apt to be very serious, the 100 per cent checks was retained. The plan was developed around a statistical tool called AOQL (average outgoing quality limit) which gives specified assurance that the final work contains only a predetermined minimum of errors. The procedure then was to sample the work of each team by means of a flying squad as the work was in progress. If a sample indicated, when compared with the sampling tables used, that the work was not of acceptable quality, the work of that team was recounted. If the sample indicated that the work of the team was of good quality, no recount of the work beyond the sample was made. (The sample sizes used and degree of sampling risk adopted were expressed in published tables designed for acceptance sampling.)

The prior planning of the sampling indicated that not more than 20 per cent of the work would be rejected and recounted. This knowledge was important because it indicated the number of reinspection teams which would be needed. Actually only 10.4 per cent of the work was recounted.

The Case of the Graded Material

The fourth and last case illustration to be presented in this paper is one arising from the experience of the writer. It involves two companies, each of which owns land exploited for a natural resource. One of the companies owns a mill. Both deliver a raw material to the mill, where it is intermingled and processed. The proceeds have been divided upon the basis of the quantity of raw material delivered. This worked satisfactorily until the company owning the mill desired to process other material purchased from outsiders and originating on other land and so evoked the question as to the appropriateness of dividing proceeds from the completed mill product upon the basis of quantity of material delivered, since it was believed that the new material might be of inferior or at least of different quality.

It was, therefore, proposed to grade the materials as they came into the mill and to give weight to the grades in dividing the ultimate proceeds. (It was impractical to segregate the material of different ownership in processing). The problem then was to determine the relative values of different grades of materials received. This had to be done by means of samples. But how large a sample is necessary to get an estimate of the value of a particular grade? The parties wished to conduct the study so as to have 95 chances out of 100 of being within 5 per cent of the proper division of profit from the processing of several grades. The necessary computations were made and it was found that the sample sizes required were well within the bounds of practicability and economy. The method which was finally arrived at for estimating values for the several grades involved the fitting of curves to the sample data, a method technically known as a regression estimate. Mathematical testing of these estimates indicated that the division of profit resulting from their use was within one per cent of the amount due either supplier. The method was, therefore, adopted as a basis for settlement between the parties.

Supplying Cost Data Economically Through Sampling

These cases serve to illustrate the assertion that statistical sampling theory is becoming an increasingly important tool in industrial and accounting operations. We need to consider whether or not it may be applied directly to the problems of the cost accountant. The writer suggests that it can be used in a regular cost accounting process. When we think of cost accounting, some of us tend to restrict our attention to formal cost accounting systems, but all of us in practice are well aware that the complete, formal cost accounting system is more often found in the textbook than in the plant. The textbooks do recog-

nize, however, that cost accounting may be conducted on a "statistical" basis, that is, on a memorandum basis or by means of occasional informal calculations. When you see the term "statistical" in a cost accounting text, it does not refer to statistical sampling theory. It merely means that the calculations are not part of the double entry system. But it is precisely in this kind of cost accounting that statistical sampling theory has its cost accounting application.

Where a substantial volume of product is made or some process or operation is done frequently and no continuous, formal cost accounting is done, we can gather cost information and, therefore, exercise cost control by estimating the unit cost from a sample. For example, we may take a sample of time cards for a certain operation and estimate the unit labor cost from them for the period in question. Note that this invokes all the advantages of other applications of sampling theory. We can determine how large a sample to take to give the degree of precision we want in the estimate. We can balance the cost of the sampling against the quality of the result we want. We can use the devices of scientific sampling to determine what items to include in the sample. We can eliminate, if we are careful, the biases that result from use of personal judgment alone in selecting and evaluating samples. In view of the fact that complete, formal cost accounting is often considered much too expensive to justify its use in small industrial operations, this should appeal to many cost accountants and to many managements as a means of obtaining cost data scientifically at a very reasonable cost.

Wider Usefulness In Prospect

Statistical sampling theory, which is based upon the mathematics of probability, is capable of improving the accuracy and economy of compiling cost data as well as other information used in industry. It is a rather recently developed tool which promises to be much more widely used in the future and, it is to be hoped, will eventually be part of the equipment of every well-organized cost accounting department.

Accounting for Fixed Assets by Cost Elements

by J. WARREN BISHOP

Chairman of the Department of Business Administration, Colby College, Waterville, Me.

This article is a re-examination of fixed asset accounting, which proceeds on an explicitly theoretical basis but not without tie-in to practical requirements and not without illustration of the form which charging of fixed asset costs would take under suggested treatments. Featuring the presentation is recognition of acquisition, ownership and operating costs of fixed assets as a fundamental consideration.

THE PURPOSE OF THIS PAPER is to explore the reasoning which underlies our accounting for fixed assets and their use. This desire to explore theoretical background and the logical application of that theory is based upon several factors. To begin with an understanding of accounting practice and the determination of what practices will meet the tests of soundness requires an occasional reexamination of the most basic of accounting concepts and objectives. Such a return to fundamentals and reappraisal of objectives is necessary now and then for the practitioner of any art or science.

Why An Inquiry Into Fixed Asset Accounting Theory?

In many fields the questions, Why am I doing this? or, Why am I doing it this way? are easily answered. The objectives upon which machine layout, raw materials storage, and many other business activities are based can be quite clearly stated and easily understood. The job is more difficult in the field of accounting, for many reasons. In the first place, accounting is not a directly productive function. Another reason is that accounting (especially in such an area as fixed asset accounting) is subject to the pressures of expediency, as has been particularly observed during periods of high income tax rates. Still other reasons could be found. Beside the recurrent need which exists for re-examination of the basis of any accounting process, in accounting for fixed assets there is such a wide variety of practice that the reader of financial statements published by corporations, the management for whom internal reports were prepared, and those whose duty it is to compile information and prepare digests must occasionally ask, "Are all of these methods right? Are they all wrong? Is there any way of judging what is right and what is wrong?" The need for such questioning becomes apparent when assets still in use are re-

ported as fully depreciated, when accountants do battle over the propriety of direct costing, and when balance sheet footnotes provide elaborate explanations of unusual asset valuation policies and procedures.

Re-evaluation of practice in the light of theory is again suggested when it is considered that accounting for depreciation is based upon an estimate of future life of the assets involved. Whenever estimates are involved, individual judgment is called into play, judgment which may be based upon sound accounting principles and logic, upon other pertinent factors, or upon both. This also applies to the exercise of judgment in distinguishing between cost chargeable to current expense and capitalizable items which will be charged to the future. The justification of the judgment used in estimates must rest in conformity to sound accounting principles.

What is practical at a particular stage of development is, paradoxically, a consideration in theory, if a temporary one. This, too, suggests a periodical new look at theory in any quarter. Although accounting is a tool, the use of which is governed by the nature of the desired product, its use as a tool is also governed by the human and mechanical facilities at its disposal. Methods and their desired results may be difficult or impossible to use if the people who work with them cannot understand their purpose or the mechanics of their application, somewhat as the quality of a product can be no better or more reliable than the capacities of the machine that produces it. The current and imminent development of electronic and other technical aids to the collection and processing of data are opening new and enlarged possibilities of detailed cost allocations and other accounting refinements heretofore impossible or impractical to achieve. This brings a need for reviewing ideas that have often been brushed aside as "theoretically desirable, but. . . ."

Further, any removal of the pressure which high tax rates and tax or other regulatory restrictions have placed on accounting methods makes a re-examination of principles and logic more potentially appealing to the practical-minded. It is well-known that tax considerations have a special relationship to fixed asset accounting.

The More Pertinent Accounting Principles

The principles that have gained general acceptance in the field of accounting have been stated in a variety of ways by committees speaking in a relatively official way for the organizations that they represent (principally the American Institute of Accountants and the American Accounting Association) and by

individuals setting forth their personal views. In emphasizing only a few general principles, I do not mean to underestimate the need for conservatism in fixed asset valuation, consistency in the application of depreciation policies and methods, or full disclosure of unusual or important facts. However, as a background for the material to follow, it seems necessary that three recognized principles receive particular attention here.

One of the generally accepted accounting principles is that cost is the basis of valuation of assets, subject to the modification that other objectively determined data may be used where consistent with accepted practice and the intended use of the asset. While this modification admits the use of cost or market value where marketing is the intended use of inventories, the weight of opinion as expressed by those looked upon as authorities in the field holds to original (historical) cost as the basis of valuation of fixed assets. This does not, in itself, deny the importance of planning for replacement in a period of fluctuating price levels nor does it deny the important part which accountants can play in the presentation of financial statements and information recognizing replacement needs. It simply provides that such data shall be presented in supplementary form and not confused with the accounting recognition of historical facts and with judgment based upon those facts.

Another principle pertinent to the present problem is that of matching related income and expense. This principle is well rooted in the needs of management (as well as in the special needs of the Bureau of Internal Revenue.) Management needs to determine the effectiveness (measured in terms of profit or loss) of actions which have been taken. A major concern of the management of a business is the investment of its capital in assets with which to produce and sell goods and services at a cost which is less than the price received. The decision to purchase or construct any fixed asset must be based in part upon a consideration and comparison of two things: the cost of acquiring, owning, and operating the asset and the prospect of what the asset will produce.

This is admittedly not an isolated consideration. The decision is based usually upon a comparison of alternatives and must take into account many factors not primarily of accounting concern. The presence of these other factors, however, does not eliminate the need for matching expected income and cost in the planning process, with a resultingly desirable matching process in the accountant's later evaluation of results. The principle and the process of matching may be obvious when the asset involved is directly productive of a saleable product or service and operates as a relatively independent producing unit, as would be the case with a vending machine, a bus, or an automatic automobile-washing installation. The principle is less obvious when the asset is something

like a file cabinet or some other asset used either as a single element in a complex grouping of assets or remote from the productive process. Nevertheless, this complexity or the remoteness of productive relationship does not justify neglect of the principle involved.

Another principle kept in mind throughout this paper is recognition of the intent for which a particular cost is incurred. Fixed assets are acquired for the benefit of a going concern or they would not be classed as fixed assets. Any measurement of their remaining usefulness must at any time be in terms of a going concern unless the intent is to liquidate. The only reference to liquidation in this paper is in connection with the possibilities of recovering sunk costs.

Three Elements of Fixed Asset Cost

When accounting for fixed assets and their use, the accountant, in fulfilling his responsibility, must be concerned with such matters as the predicted period of recovery of investment and the tax effects of alternative accounting procedures. However, the concern here is with the necessarily theoretical viewpoint of allocating fixed asset costs over the useful life of the asset. I say "necessarily theoretical" for two reasons. It is necessary to build sound practice upon sound theory. Any consideration of depreciation must be in a sense theoretical because the accountant is still facing the unknowable future and is making decisions before all of the facts are in.

Any fixed asset, whether purchased or constructed, must have some period of proposed useful life. This is the period, by any reasonable definition of "useful," in which the asset will be capable of producing saleable goods or services or in some way contributing to the income-producing possibilities of the business. By generally accepted definition of the term "fixed asset" this length of life extends beyond the fiscal period in which the asset is acquired. This longer period then, is the "matching period" of all costs related to the asset in question.

In fixed asset management, three general types of costs are incurred in the expectation of obtaining the intended benefits. These costs may be classified in various ways. They may be called acquisition, ownership, and operating costs or they may be called sunk, fixed, and variable costs. The two sets of titles are roughly parallel, the first resting on the reason for the incurrence of the costs and the second on the characteristics of the costs in terms of their effect on future decisions and their burden in terms of recovery through operation. Financial management and the planning of asset use make the distinction between these types of costs important.

Accounting, being a tool of control as well as a device for financial reporting,

must also recognize the distinctions even though the borderlines between them and allocations among them may be based more upon seasoned judgment and the practical limitations of workable systems than upon factual accuracy.

Acquisition costs can be considered as those which contribute to the asset's ability to produce the desired goods or services. This ability is, in reality, two-dimensional. One dimension can be thought of as a "static capacity," using the term in a loose sense, since it takes into account such various capacities as the physical content of a tank, quantity (production rate) and quality of product of a machine tool, and the ability of a store-front to attract customers. The other dimension is in time, the length of useful life of the tank, the total units which the machine tool can produce before it becomes incapable of further effective production or before its product becomes unsaleable, and the length of time in which the store front continues to be competitively (therefore "usefully") attractive. It will be noted that the second dimension is not necessarily measured in customary units of time, a fact which is important but not immediately pertinent. Among acquisition costs can be grouped the initial costs of design, purchase, and installation plus all subsequent costs of additions, betterments and parts replacement.

The second general class of fixed asset costs consists of those associated with the ownership of an asset in a state of readiness to perform its function, that is, a state of usefulness. These are the costs which are not directly dependent upon use itself or, at least, upon rate of use. In this class we find such items as property taxes and fire insurance. In the case of installed machinery, we would also find that ownership in itself involves a certain amount of protection and maintenance costs not dependent upon use, plus an element of housing cost. This latter term covers the building occupancy costs (rent, heat, maintenance, etc.) of the space occupied by and related to the machine plus similar costs of facilities required for the machine's intended use, such as power supply. Interest may be an added element of ownership cost, although it is one which carries with it many complications.

The third general class of fixed asset costs consists of those incurred in the operation of the asset. These range in their nature from maintenance, repair, and "housing" costs which have been incurred because of use, to the cost of labor and power used in the operation of the asset. The test question for costs to be included in this class might well be. Would this cost have been incurred if the asset had been idle for an extended period of time? The word "extended" is admittedly inexact, and its application to any given situation controls, in part, the borderline between this and the ownership cost classification.

The Simple Case of the Completed Venture

The three-fold classification of fixed asset costs would be unnecessary and many accounting problems would disappear if the determination of profit or loss could wait until the life of the asset had expired and if costs and revenues could be specifically identified with a single asset or with a group of assets having a single life span.

The accounting for any short-term venture serves as an illustration of this point. Take for example the hypothetical Valley City Centennial Exposition. Land is rented. A stage and concession booths are built. Insurance is purchased. A manager and numerous other people are employed. Advertising, printing, taxes, and a variety of other costs are incurred. When the exposition week is over, the income from admissions, concessions, and the sale of salvaged materials is matched against the total costs to determine whether the venture realized a profit or loss. Nothing could be simpler. All costs have been for a single general purpose and the purpose has been concluded. Although, for example, there may be some interest in classifying costs in sufficient detail to distinguish between the wages of the carpenters who built the stage and the actors who used it, such a classification is not a necessity from the point of view of matching income and expense.

Complications enter the picture only when it becomes necessary or desirable to determine the profitability of the concessions or of Tuesday's show. If financial statements were to be prepared at any time before the exposition opened and was in a position to provide income, all costs to date would be considered as purposeful and would be carried forward to be matched against future income. If the sole accounting purpose were to determine ultimate profit or loss on the total venture, the costs of tangible properties, such as stages and booths, would be in the same general deferred charge category as prepayments for rent and insurance. The only possible reason for showing a loss for the period before the opening of the Exposition would be to show the cost of "false starts," expenditures on projects later abandoned as not possibly contributing to the purpose of the venture. In other words, all costs incurred up to the time that the venture is in a condition of readiness to produce income are asset costs—costs intended to benefit future periods.

The accounting problems would be equally simple if the illustrative case involved the manufacture and sale of products related to a single season or event, with liquidation of the business when its objective was completed. Cost classifications may be necessary for tax returns but the problem of distinguishing between assets and expenses would be faced only if interim financial statements became necessary or desirable.

The Complex Case of the Going Concern: Acquisition Costs

If accounting practice is to follow the principle of matching income and expense, the costs which are incurred with the expectation of benefiting future periods should be deferred until the period of potential income arrives. In many cases, the application of this idea runs into almost insurmountable practical difficulties in determining the time and duration of the period of potential income, as well as into conflict with the usually laudable objective of conservatism, although this is not always true. When planning the advertising of a special sales event, the advertising expenditure is a cost of the event and is matched against anticipated sales as a part of the process of budgeting for this particular "venture." Any accounting process which is to provide profit data for the event must include the deferral of the advertising cost until such time as it can be matched against realized income from sales.

In the absence of such a venture situation and viewpoint, the more typical process is to consider advertising as an expense of the period in which the advertising is done rather than of the period in which the resulting sales are made. This is reasonable conservatism, because the advertising may or may not have the anticipated effect on sales. It is even better justified on the grounds that the cost and the resulting income are likely to occur in the same fiscal period (as was also the case in the venture example) and on the somewhat less valid but thoroughly practical grounds that profits will not be seriously distorted if the matching process is abandoned in a business in which advertising costs and sales income do not vary substantially from one period to the next.

The matching of advertising expense is not irrelevant to the fixed asset problem. In it there is both a comparison and a contrast to the matching of fixed asset costs to sales income or value added through the use of the asset. If the accounting logic used in the "simple" problem is to be used in more complex situations, all costs incurred in anticipation of putting a single fixed asset or a complex grouping of fixed assets to productive use would be accumulated until the period of potential productivity started, to be then charged in such a way as to be properly matched against the benefits either potentially or actually derived from their use. (The use of the words "potentially or actually" will be amplified later.)

The matter of pre-operating charges to expense is important to consider. Although it is presumably not the conscious practice of informed accountants to charge the cost of fixed assets to expense in the period of acquisition, it has been the writer's observation that periods of plant expansion and improvement

are likely to show expenses of one sort or another which are actually related to the acquisition of the new assets, whether such increased expenses are justified on the grounds of conservatism, on the more practical but less reasonable grounds of income tax avoidance, or as a matter of reducing the bookkeeping problems. The latter two justifications are both matters of expediency that make no claims to being based on sound theory. Moreover, the use of the principle of conservatism in such cases seems to lack logical support.

This may well be emphasized since it seems reasonable to conclude that, if any one element of the cost of a fixed asset is to be deferred until the asset is in a position to fulfill its intended function, then all such elements are properly deferrable. For example, preliminary engineering expense, whether carried on by the company's own employees or by consultants retained for the purpose (even when devoted to the exploration of several alternative courses of action, of which all but one must be rejected) is as much in the nature of cost reasonably and purposively incurred in achieving the end result as the invoice cost of the tangible equipment purchased. If conservatism is valid grounds for considering any of these costs an expense of the period in which incurred or paid, it is as valid for any of the other cost elements. Pre-operating write-offs (charges to expense) defeat the possibility of a complete matching of income and expense at a later date, whether such write-offs are based on conservatism or expediency.

One item that deserves special consideration is the interest cost related to assets under construction or in a pre-productive state. In accounting for acquisition of purchased or constructed fixed assets by public utilities, it is considered proper by regulatory authorities to capitalize up to the point of readiness for productive use both interest on funds borrowed for the purpose and on the utility's own funds so employed. Actually there is no great difference between the interest charges during construction and those after the period of usefulness starts, whether the interest arises through the terms of a purchase contract, as a result of temporary borrowing, or through allocation of a portion of the interest cost involved in the company's relatively permanent capitalization. Whenever the funds used carry the obligation to pay interest, such interest must be matched against the income derived from the use of the assets if a full accounting for the profitability of the investment is to be made. If the funds are employed in the purchase or construction of assets for the benefit of later periods, then it seems reasonable to assume that here too is a cost which must be deferred to a period in which there is potential income against which it can be matched.

This is not to say that interest should always be included in fixed asset cost.

In a public utility a return on all investment regardless of the source of the funds (including even reinvested earnings) is considered as a cost to be covered by the income from rates charged. Return on ownership investment and reinvested earnings is, in the nonregulated situation, a risk profit or loss rather than a cost of doing business in the general sense of the term.

The Case of the Going Concern: Treatment of Ownership Costs

Just as in simpler accounting for a venture, no problem is made of distinguishing between costs incurred before and those incurred after the assets are in a condition of readiness to fulfill their functions, neither does it give consideration to the problem of distinguishing between costs based on ownership of the assets and those based on their operation. Although the difference in the reasons for incurrence of these two classes of costs may be readily resognizable, a distinction between them is rarely recognized for accounting purposes in many types of businesses. However, the cost accountant does recognize the difference between fixed and variable and between uncontrollable and controllable costs. Both of these distinctions are relevant to the present discussion.

Ownership costs are of two main types. The first of these we have already studied — the costs involved in acquiring the asset. These may now also be regarded as sunk costs. They have been irrevocably incurred and can be recovered only through disposal of the asset or placing it to productive use. In the former case gain or loss is realized through the disposal process, in the latter case by some appropriate method of depreciation accounting the acquisition cost is matched against the income realized during the potentially useful life of the asset.

Ideally, from the viewpoint of the theorist, the appropriate method of depreciation accounting should recognize the relative importance of such factors as the wear and tear resulting from use, the action of the elements, and obsolescence, as they contribute to the decline in the remaining usefulness of the asset. This is admittedly much easier to discuss as a matter of theory than it is to put into practice because of the difficulty of forecasting and the practical problems of record-keeping. It is one of those areas in which it seems, however, as though the development of high-speed automatic data processing systems offers opportunities for problem-solving that have until recently existed only in the most unfettered imaginations.

Theoretically, the decline in remaining usefulness of an asset involves more than ownership cost and is divisible into that part which is based upon the fact of ownership (obsolescence and the irresistible forces of decay are included

in this) and that part which is based upon use (wear and breakage). As an example of this process of dividing depreciation into its parts representing the categories of ownership and operating costs, assume that a machine, installed and ready for use, has cost $20,000. It is estimated that removal costs at the end of its useful life will offset any salvage value. With normal protection against rust and other physical damage it may be assumed that the machine, if unused, could be kept in a usable condition for fifty years. The maximum useful life, however, is reduced by the prospect of obsolescence or inadequacy to twenty years. This provides an ownership cost, arising solely out of the cost of acquisition, of $1,000 per year.

The operation of the machine brings into the picture added costs which appear in either or both of two ways. Either the life of the machine is shortened by the destructive effect of operation or else added maintenance, repairs, and the replacement of component parts serve to keep the machine in operating condition by off-setting the destructive effect, perhaps until obsolescence or inadequacy ultimately force its retirement. In this connection, it is desirable in theory and common in practice, to treat major parts replacements as the retirement of old assets and the acquisition of new ones. It is equally desirable in theory, but understandably less common in practice, to accord similar treatment to the replacement of minor parts.

For our illustrative machine, assume that major replacements are recorded in the asset accounts and that it is estimated that a total of $7,000 of repairs and minor replacements will keep the machine in usable condition for twelve years at the predicted level of operation. This means that the operating cost arising from the destructive effects of predicted operations is determined as follows:

Acquisition cost	$20,000
Less ownership cost for 12 years	12,000
Balance chargeable to operation cost	8,000
Predicted repairs and minor replacements	7,000
Total operation cost for predicted life	$15,000

At the predicted level of operation, the annual operation cost would then be $1,250. Carried to its logical conclusion, this presumes the use of a reserve against which repairs and minor replacements would be charged as made. It is further assumed, probably not unreasonably, that added maintenance costs caused by operation (such as cleaning, lubrication, inspection, adjustment, and sharpening) may be charged to operations as incurred without violation of the principle of matching expense and income.

In addition to the ownership costs which arise through the allocation of

acquisition costs to periods of usefulness, there are others incurred during the period of ownership. These have already been described quite thoroughly earlier in this paper. When these two types of ownership costs have been added together, the result is not necessarily fixed in amount. Even the portion of depreciation not based upon use will not necessarily result in a straight line charge. Moreover, these further ownership costs are obviously going to vary with property tax rates, insurance rates, etc. Nevertheless, they are fixed in their character, in that they are inescapable as long as the asset is owned and still has potential usefulness.

In considering how to charge ownership costs, the argument is properly based primarily upon the principle of matching cost with income, since this principle is so directly related to the functions of management whose objectives accounting must serve. In brief, the costs of ownership must be matched against income, either potential or realized. If all periods in the life of a business and, therefore, in the life of the assets owned by the business are potentially productive of income, it seems reasonable to assume that all should be charged with their share of the costs of asset ownership, whether income is actually realized or not. In the case of a manufacturing concern the potential usefulness of manufacturing equipment is in the amount and quality of product it is capable of producing, whether the product is produced for inventory or for immediate sale, and, also important, whether the product is actually produced or not.

If this line of reasoning is as valid as it seems to the writer, then the unit cost of the product actually produced should contain, in addition to its share of operating costs, a share of the ownership costs proportional to the capacity of the fixed assets used in its production rather than proportional to the actual production. This will be given effect to in the concluding illustration, still to be presented. The ownership costs associated with the unused element of capacity are then a proper charge against the period of ownership, an expense often referred to as "excess capacity cost" but perhaps more often arrived at in a different way and containing cost elements other than those directly associated with ownership. There may be an appropriate modification if the seasonal nature of the business (as in vegetable canning) or some other controlling characteristic results in some periods being necessarily unproductive. Then it is apparent that ownership costs must be matched only against the results of the potentially productive periods.

Fixed Asset Operating Costs

The costs of operating fixed assets appear to offer the least accounting problems. Other than maintenance, repairs, minor replacements, and the operating

PRODUCT COSTING OF FIXED ASSETS
BY ELEMENTS AT DIFFERING VOLUMES

Fixed asset cost elements	Period	Product
Period 1 : 8,000 Units		
Acquisition costs		
Ownership element of depreciation	$10,000	
Operating element of depreciation ($1.50 per unit)		$12,000
Ownership costs	16,800	
Operating costs (including provision for repairs and minor replacements at $1.00 per unit)		32,000
	26,800	44,000
80% of ownership costs	- 21,440	/ 21,440
Loss on utilization of equipment	5,360	
Cost of product ($8.18 per unit)		65,550
Period 2 : 11,000 Units		
Acquisition costs		
Ownership element	10,000	
Operating element		16,500
Ownership costs	16,000	
Operating costs		41,000
	26,000	56,500
110% of ownership costs	28,600	/ 28,600
Gain on utilization of equipment	2,600	
Cost of product ($7.74 per unit)		85,100

EXHIBIT 1

element of depreciation, they are generally not thought of as being specifically fixed asset costs but as being costs incurred for the operation of a business or the production of goods, a situation also requiring the use of fixed assets. They are, however, especially in manufacturing concerns, directly related in character and amount to the fixed assets used and were presumably given substantial recognition in many cases in the making of decisions involving the purchase or construction of the assets. They are, therefore, subject to recognition as related to the asset when, through periodic reports or special studies, the accountant is called upon to measure the efficiency of the asset's performance. It is too obvious to require discussion here that low ownership costs may be offset by high operating costs (labor, etc.) and vice versa.

Theory to Application

For the reasons set forth as an introduction, this paper has been concerned primarily with re-examining theory. The area has at times seemed to cover all accounting for costs, yet it can be seen that all of the costs discussed are those directly related to acquiring, owning, and operating fixed assets. If the exposition has seemed also to extend beyond fixed asset accounting, that is because management's decisions in the investment of funds in plant and equipment and its weighing of alternative methods of achieving the company's objectives must

often be centered upon or critically influenced by the profit-making potential of units or complex groups of fixed assets.

The purchase or construction of long-life equipment commits the business to a course of action (including future operating expenses) which must often be pursued for the life of the assets, the sole alternative being to face the risks of loss of sunk costs through premature disposal or conversion to other uses. If planning is to be done wisely, it must be based upon a study of all costs which will be affected by the decision made. In many cases such a study must take into account raw material costs and usage, since these, too, are likely to vary with alternative selections of equipment. At any rate, the cost study must go to a point at which it can safely be said, "All other costs will be the same regardless of what type of plant and equipment are used."

However, we do not need to close without a dose of practicality. To give added point to this study of theory, let us see how it applies to the costing of a product or service. The illustration in Exhibit 1 is based upon several assumptions. First, the equipment was acquired with the intent that it turn out a certain product. This potential usefulness is continuous (not seasonal or intermittent). Second, all of the costs of acquisition were accumulated up to the point where the equipment was ready to use. Third, it has been determined that a portion of the depreciation is due to use alone and that the remainder is not due to use. Further, the total amount produced during the equipment's useful life has been estimated and a normal level of production determined to be 10,000 units per fiscal period. As shown by Exhibit 1, in Period 1, 8,000 units were produced and in Period 2, 11,000 units were produced.

This illustration is offered to make it clear that the classifications and distinctions recognized and pointed up in this article are not unrelated to the accounting situation concretely considered. The data comes through the breakdown of fixed asset costs outlined earlier in text and shows a means of appropriately varying the ultimate charge to period and product costs in line with production volume, by a transfer of proportionately varying amounts of ownership costs from period to product costs.

The illustration may have especial pertinence as to the division of depreciation costs elements. At the present time, direct costing advocates would count this wholly a period cost. If so, it may often be the most important one, for technological development points toward increased automation, with the accompanying prospect that, in particular cases, added depreciation will replace other present costs. The considerations advanced in this article suggest a new approach to this and like problems.

Production Costing in a Pharmaceutical Company

by OLIVER R. ALTUM

Manager, Cost Accounting Department, Eli Lilly and Company, Indianapolis, Indiana

Overall control of cost performance and ready information as to operating results are the twin goals of the procedures studied in this paper, which reflects the control problems of the industry treated and may also be helpful in connection with those of process industries generally.

MANAGEMENT REPEATEDLY ASKS this question, "What does it cost?" Often the answer needs to be particularized to the purpose in mind. For example, when the selling price is determined on an item, its foundation is product cost. Therefore, it is important to study this subject extensively, master its technique, organize it efficiently and administer the resulting program sensibly. This article attempts to describe established methods responsive to the needs of management. These needs can be summarized as follows:

1. To determine profitability of production as conditions exist.
2. To inform production management of cost effects of its performance.
3. To furnish basic information for cost estimated in the establishment of selling prices.
4. To establish statesmanship in the exercise of cost accounting between the production area and management.

No one will disagree, no matter what method of pricing may be used for sales purposes, that the price must include all production costs, administrative expense, marketing expense, shipping expense and produce a reasonable profit. It is particularly important to know production costs, which have been continually spiralling upward. Therefore, it is essential to establish a method to determine total production costs and to do everything possible to advise management of significant changes, in order that a course of action may be taken to keep them down.

The method of determining production costs and their application and use by a large pharmaceutical manufacturing concern is described here. The standard batch cost method is used. Exhibit 1 represents the Job Cost Sheet which is used for obtaining production costs. As the method for posting data by bookkeeping machines is described, we will be reminded that there are three major components, material, labor, and process overhead. That there are only three primary cost factors indicates that a simple costing method can be devised, one which requires little effort.

JOB COST SHEET

ITEM					LOT NUMBER	
DATE RECD.	DATE CLOSED	THEORETICAL YIELD		ACTUAL YIELD	INV. CODE	AUDIT BY

IN PROCESS INVENTORY

DATE	LOT NUMBER	SOURCE	MATERIAL	TOTAL MATERIAL	LABOR AND BURDEN	TOTAL LABOR AND BURDEN	TOTAL MATERIAL PICKUP	TOTAL MFG. COST STORES 10

UNIT COST	STD. COST	PER UNIT	MATERIAL	PROCESS	TOTAL ACTUAL	

BULK MATERIAL INVENTORY

DATE	SEQUENCE NO.	PKG. SIZE	QUANTITY	PKG. ORDER AMOUNT	BALANCE	PROOF BALANCE		
			BEGINNING BALANCE →					

COST SHEET—WORK IN PROCESS

EXHIBIT 1

Bases of Material, Labor, and Overhead Charges

A method for dispensing all raw material has been established. For this purpose, a preprinted requisition is used for listing the kind and quantity of material to be supplied. After quantities are supplied, checked and delivered to the production center, the requisition is returned to the production requirements department where deductions are made from stock records and priced at purchased price or manufactured price. The priced requisitions are then forwarded to the cost accounting department for extension and posting to the proper job. If material must be replaced due to loss, breakage or spoilage in processing, the job should show the proper debit and credit for the replaced material. The charge is made to variance cost of sales. The application of this account will be discussed further on.

Process-type production requires allocation of labor and overhead by use of standard minutes, labor hours or equipment rates. There are several workable methods to record productive labor on the individual jobs in process, following through the various stages of manufacture. The time standards developed by the industrial engineering section for incentive purposes furnishes us with a satisfactory method for the allocation of labor and overhead for manufacturing

EXPENSE ANALYSIS AND BUDGET COMPARISON
STATISTICAL DATA

BASIS FOR MEASUREMENT OF EXPENSE — YEAR TO DATE	LAST YEAR TO DATE	TWO YEARS AGO TO DATE

12 MONTHS EXPENSE LAST YEAR	ACCOUNT
ORIGINAL ANNUAL BUDGET THIS YEAR	MONTH ENDING

ANNUAL BUDGET		EXPENSE CURRENT MONTH	EXPENSE YEAR TO DATE	BUDGET YEAR TO DATE	OVER OR UNDER BUDGET
	10000 Wages and Salaries				
	11500 Employee Benefits				
	12000 Repairs and Maintenance				
	13000 Misc. Supplies and Expense				
	13700 Engineering Job Orders				
	14000 Materials				
	15000 Taxes, Insurance, and Depreciation				
	15500 Utilities				
	16300 Charges from Other Accounts				
	16500 Charges to Other Accounts				
	Net Expense				
	INFORMATION FOR ACCOUNTING USE ONLY				
	16000 Overhead Distribution				
	Total Expense				
	17000 Allocation to Mfg. Costs				
	17250 Allocation To Service Accounts				
	17500 Allocation to Operating Expenses				
	Balance				

EXHIBIT 2

operations to products. (As to labor control, the department head or supervisor is the key to the efficient use of labor by transfer of operators from one job to another without delay.)

In order to determine a standard minute rate for use in extension of labor and overhead for posting to job cost sheets, full cooperation of the production division and department head in prerequisite determinations of total expense, units scheduled, personnel requirements and average pay rate is important. A capacity budget based on 80 per cent operation is required. The 80 per cent operation takes into consideration changeover from one job to another, rest periods, absenteeism and other delays which may vary with type of operation.

*PERFORMANCE INDEXES COMPARING RESULTS AT STANDARD AND ACTUAL

1. Index of Man Hour Usage: (Wages, Benefits, Salaries)			
2. Actual wages @ % =		= $	
Standard wages @ % =		= $	
Gain/Loss		= $	
Performance Index		=	
Performance Index - 12 month period	%		
2. Index of Material Usage:			
Value of Material Supplies		= $	
Standard Material Cost of Good Units Produced		= $	
Gain/Loss		= $	
Performance Index		=	
Performance Index - 12 month period	%		
3. Index of Controllable Expenses: (12000, 13000, 13700)			
Actual Controllable Expenses		= $	
Budgeted Controllable Expenses		= $	
Gain/Loss		= $	
Performance Index		=	%
Performance Index - 12 month period	%		
4. Index of Facility Utilization: (Building & Equipment)			
Actual cost of taxes, dep'n. insurance		= $	
Standard cost of taxes, dep'n., insurance		= $	
Gain/Loss		= $	
Performance Index		=	
Performance Index - 12 month period	%		%
5. Index of Overhead Utilization (15500 & 16000)			
Actual cost		= $	
Standard cost		= $	
Gain/Loss		= $	
Performance Index		= $	%
Performance Index - 12 month period	%	=	

*In practice there are also indexes representing categories 1-3, 4 & 5, and 1-5.

EXHIBIT 3

Performance Reports

A monthly departmental Expense Analysis and Budget Comparison (Exhibit 2) is issued and to it is attached a summary analysis in the form of Performance Indexes Comparing Results at Standard and Actual (Exhibit 3) which reports performance indexes to wages, material, controllable expense, facility utilization and overhead utilization. Variance from standard cost credits for labor by production centers as compared to actual cost of operations, is transferred to the fringe cost of sales. It has been pointed out that overhead is charged in combination with direct labor. The standardization of rates used for this charge forces out the underabsorbed expense on a current basis and affect profits accordingly. In this connection, indirect labor cost should be controlled to the lowest possible level, in order to keep cost down. This is as essential as direct labor control. Further, the distribution of plant overhead, must reflect a careful study, so that each product bears a proper share of the expense and its cost as presented to management is a true cost which will aid in making decisions.

What Bulk Standard Cost Includes

At this point it is necessary to describe in more particular the make-up of production cost which comprises the standard bulk cost of a product used to

DEVELOPMENT OF STANDARD MINUTE RATE TO BE EFFECTIVE 1-1-54

Account No.	Account	Expense Average/Month (1) Budget	(2) Actual	Capacity Budget
10000	Wages	$17,783	$18,110	$22,919
11500	Employee Benefits	1,783	1,803	2,292
12000	Repairs	1,283	1,815	2,000
13000	Miscellaneous Expense	1,667	1,524	2,000
13700	Engineering Job Orders	1,096	1,444	1,100
15000	Taxes, Insurance & Depreciation	1,388	1,374	1,500
15500	Utilities	1,671	1,931	2,000
16000	Overhead Distribution	18,292	17,555	19,000
16300	Charges From Other Accounts	1,692	1,758	2,000
16500	Charges to Other Accounts	(75)	(2)	(a)
	Total	$46,580	$47,312	$54,811

Calculations 1. Wage cost: $2.23/Hr. x 173.3 Hr. =$386.00/Mo. x 50 Emp. =$19,300
Sal. cc. . etc. =$3619.00 Total $22,919/Mo.
2. Standard minutes: 57.5 Emp. x 10,400 Min. /Mo.
= 598,000 Min. @ 95% accomplishment = 568,100 Min. /Mo. Rate per minute $0.096

(1) Based on full year 1953
(2) Based on 8 months 1953

EXHIBIT 4

transfer bulk stock to a control account. The following basic data are required: medicament cost (at standard cost), supplemental materials, primary containers (ampoules and empty capsules) processing cost (labor and burden), material handling charge, normal loss allowance (basic type products), and credit allowance for recoverable scag material. Together these make up total bulk standard cost. As indicated before, these reflect processing costs at a level utilizing approximately 80 per cent of the department's capacity and optimum methods available in that department. It may also be emphasized again that it is important to consult the department head for assistance in determining each department's capacity and the projected budget of each department operating at capacity. Exhibit 4 indicates the method of computing standard minutes departmentally. The standards for materials reflect the costs at a level which allows for expected overfills, and breakage in handling. In other words, a standard bulk cost is an attainable goal in manufacturing cost providing the standard is set at a level reasonable for normal operations. A standard is not changed except for market changes in material cost, change in method of processing and labor rate changes.

The bulk standard developed is posted to each lot manufactured and represents the value to be transferred to the bottom half of Exhibit 1. The control of bulk inventory is accomplished as the packaging orders are processed through the finishing departments by deducting the quantity used and also the standard dollar cost from the beginning balances.

Costing of Finishing Operations

The pharmaceutical industry is required to offer a well-balanced price list of items to the medical profession in many types of package sizes. These pack-

FINISHED STOCK INVENTORY CONTROL

	Standard cost	Incidental costs	Incidental cost %
Beginning Inventory 12/31/53	$522,268	$24,690	4.73
Jan. sales and net inv. credits at Standard	-279,401. *		
Jan. sales - fringe cost application by %		-13,215. †	
Jan. production from Prod. Recap sheet	313,464.	5,335.	1.70
Inventory 1/31/54	$556,331	$16,810	3.02
Feb. sales and net inv. credits at Standard	-282,161. *		
Feb. sales - fringe cost application by %		-8,521. *	
Feb. production from Prod. Recap Sheet	228,434.	11,169	4.89
Inventory 2/28/54	$502,605	$19,458	3.87

*Sales and Net Inventory Credits are determined from tabulating reports showing withdrawals at standard cost.
†Incidental costs are applied to the standard cost of stock withdrawals according to the percentage of standard cost to fringe cost in inventory balance at first of month. In December, sales costing will be delayed to add in December production so as to use the year-end inventory ratio.

EXHIBIT 5

ages may consist of single dose units or quantity sufficient for a series of doses and use, as may be required for treatment of patients. The company's package development division determines the package requirements for each product and prepares standard packaging instructions. This information is furnished for each packaging order and a copy is provided to the standard cost section in order that a standard cost for the unit may be set up. This furnishes the information to the tabulating department for master card preparation for each package size and each item in the price list. The cost data shown permits costing entries for packaging materials.

As to labor and overhead costing, the finishing department has the responsibility of filling and finishing the product according to requirements based on sales volume. This necessitates straight-line filling equipment plus labeling machines and finishing belts. The methods engineers establish the standard minutes required for the operations used in work measurement and the schedule of work ahead. The standard minutes are used by the standard cost section in determination of the standard filling and finishing allowance for packaging of the unit in terms of cost.

A packaging order follows the goods through the finishing department and is used to record the standard packaging instructions, and the number of packages to be completed and delivered to finished stock for shelf and case stock. This order indicates the number actually transferred to finished stock and the date the quantity was received in the shipping room.

Incidental Costs

There are additional items of cost not included in the individual package standard unit cost because they are so minor in amount. Those costs are not included in product cost due to the fact that they do not have a direct bearing

COST OF SALES BY COMMODITY GROUP (ILLUSTRATIVE COMPUTATION)

	Net trade discounted	Standard cost	Incidental cost %	Incidental cost	Variance cost	Total cost	Cost of sales %
Ampoules	$105,103	$69,811	9.47	$4,717	$2,103	$56,631	53.88
Liquid products	150,030	82,479	6.89	5,683	1,683	89,674	59.77
Pulvules	175,226	90,930	3.25	2,955	5,260	99,145	56,58
Tablets	180,432	97,119	4.73	4,593	3,270	104,982	58.18
	$610,791	$320,339		$17,948	$12,145	$350,432	57.37
	(1)	(2)		(3)	(4)	(5)	(6)

(1) Figures in this column are obtained from punch card accounting used for invoicing.
(2) Figures in this column are calculated in tabulating department by extending the quantity sold of each item and package size by a standard unit cost.
(3) Figures in this column are calculated by applying to total standard unit cost by product lines, the fringe cost percentage experienced.
(4) Figures in this column are summarized from vouchers prepared monthly according to classification.
(5) This column is a summation of columns No. 2 and No. 3 and No. 4.
(6) Percentages are obtained by product lines. Column 5 divided by Column 1, and details cost by production center as well as total cost for the group.

EXHIBIT 6

upon the increase of the individual package cost and therefore become minor to this category. Items charged in this category to centers rather than products include direct glass printing, glassine wrappers, cotton use, corrugated boxes, labels printed, and package literature printed. The ratio of these costs to the standard cost of the center portrayed in Exhibit 5 serves as a control. The percentage is also used for charging these items to inventory and cost of sales.

Computation of Cost of Sales; Variances Disclosed

The method in use for obtaining cost information for production management and its use to achieve better performance have been described. The method in use to furnish sales management information on cost of sales by selected commodity groups remains to be set forth. Management makes the decisions as to the classifications on which it desires to have information from year to year. These groups may represent specialties or standard items for sale, such as tablets, ampoules, liquid products, pulvules, and other related items. Each forms one commodity group.

The tabulation of sales by commodity group may be secured by manual or punchcard tabulation. The method chosen depends upon the volume of business. In order to obtain the cost of sales, four factors are considered: standard cost, fringe cost, royalties, and variances from standard cost. These represent items of cost which are nonrecurring, nonstandard operations, and other departures from standard cost. The elements which are totalled to make up the variance figure are:

Manufacturing yield variances	_____
Raw material price variance	_____
Loss due to repackaging for specific orders	_____
Loss on rejected lots	_____
Underabsorption of manufacturing department expense	_____
Items destroyed due to obsolescence	_____
Loss due to re-work	_____
Inventory adjustments	_____
Total variances	_____

These variances are classified according to the commodity groups and are included in the cost of sales totals monthly. Exhibit 6 represents a recapitulation of the information which is developed in detail by commodity groups. A master control of these totals for the various groups is necessary in order to tie in with the general ledger.

Conclusion

The method which has been set forth represents an expedient means for the determination of profit on production under conditions as they exist and also makes available to production management a compilation of variances which affect performance, indicating where savings potential exists in the manufacturing process. It facilitates the analysis of variations by their presentation as part of cost of goods sold and aids in the establishment of selling prices. The system adapts itself readily to punch card accounting where multiple use of information is required. It also provides a good basis for control of inventories by intermediate commodity groups.

Costing Tricot Fabrics for Pricing Purposes

by KURL STEVENSON

Assistant Secretary and Treasurer, Hornwood Warp Knitting Corporation, Wadesboro, N. C.

The costing literature of the textile industries is amplified in one direction by the accompanying article which offers a compact expression of cost-for-pricing calculations for tricot fabrics. It also gives a lead or two to the nature of the tricot knitting operation and supplies considered introductory and closing statements of the degree to which costs may be helpful in pricing.

THE SUCCESS OF A COMPANY may depend on its management's ability to select (but not necessarily determine) the right prices for its goods. This price-making function naturally requires a knowledge of economics, market conditions, transportation problems, and cost techniques. This last aspect of the problem is the subject of this paper. Price-making which recovers all direct costs, together with a fair allocation of the fixed and variable expenses (impossible on an exact basis) is easy to advocate but hard to apply because overhead relates to individual units only in theory and is not a calculable element of specific product cost in some single precise figure.

Hence, as applied to textiles, it is readily accepted that the cost of a fabric is not the result of a single exact mathematical calculation. However, some sort of cost calculation should at least be availed of for guidance in determining the price of the goods. Prices of tricot fabrics are forced into patterns established by competition. The question becomes one of how much cost is recovered by any given price. The slim-margin items are tolerated. The wide-profit styles are actively pushed. Price-cost relationship must be constantly appraised as a basis of production and sales policy, even when prices themselves seem immune to the influences of cost computations.

The Industry

Cost calculations for spinning and weaving have been thoroughly covered in many types of publications but there is a lack of literature relating to costing tricot fabrics. However, there are numerous articles and books on the design, manufacture and finishing of tricot fabrics. These are useful for background. Tricot fabric manufacture is distinguished by high speed machines knitting a run-proof jersey fabric that instantly regains its shape when stretch is released.

It may be helpful to comment briefly on the tricot industry. It has emerged as the most progressive and fastest growing branch of the textile industry. Feminine demand for tricot fabrics has well established them in the women's wear market. Great strides have also been made in the men's sports shirt field. A survey (by Textile Machine Works, Reading, Pa.) of mills operating warp knitting machines in the United States discloses, on the basis of figures for several years ago, the following indications of manufacturing unit size:

	1952		1951	
Plant size	Mills	Machines	Mills	Machines
Operating over 50 machines	20	1713	18	1577
Operating 20 to 50 machines	32	906	24	724
Operating fewer than 20 machines	85	781	67	570
	137	3400	109	2871

Inasmuch as the relatively small plants, those with less than 50 machines, represent the major portion of the mills and account for about 50 per cent of the productive capacity of the industry, this paper will reflect primarily the problems of that group.

Production Rate; Yarn Cost

The standard method of designating the stitch count in tricot knitting is by measuring in inches the length of fabric knitted in 480 courses. In practice, a mark is made on the fabric and, when this number of courses has been knitted, another mark is made in the same relative position. The distance between the two marks is measured and the result in inches is called the quality. At the same time, the end from the top and bottom warp which traverses across the width of the machine is marked. When the 480 courses have been knitted, the distance the marks have traveled is measured to determine the length of the runners. A rack is the unit of measurement consisting of 480 courses.

The speed of the tricot machine is indicated by the number of racks knitted in an hour. Where the machine is operating at 384 r.p.m., its speed is 48 racks per hour. The conversion factor of 8, used in this computation, is obtained by dividing 480 (courses per rack) by 60 minutes. In 8 hours of nonstop operation 384 racks will have been run (48 x 8). Therefore, the number of revolutions and courses per minute are considered as interchangeable for a shift of 8 hours, in the calculations to be used here for illustration.

Yarns are dealt with on a weight basis and the fabric cost calculations are facilitated when the yarn content is costed accordingly. The general practice in

COST AND SPECIFICATION SHEET

Style 100 Date Aug. 20, 1954

Product data:

Yarn top	75/20 dull acetate @ 91¢ lb.	Top runner:	61"
Yarn bottom:	15/1/0 nylon @ 6.02 lb.	Bottom runner:	40-1/4
Width:	167" (most tricot machines are 28 gauge. 4672 ends divided by 28 produces greige fabric 167 inches wide)	Quality:	7" or 5.14 (36" - 7")
		R. P. M.	384
		Racks per cut:	250
Ends top:	4672	Ratio 3 to 2 (ratio of top runner to bottom runner)	
Ends bottom:	4672		

Computations:

Acetate production formula is:

$$\frac{\text{rpm or courses per minute x runner x ends}}{36\text{" x (yards per lb. x size and oil per cent)}} = \text{lbs. produced in 8 hrs.} = \frac{384 \times 61 \times 4672}{36 \times (59.527 \times .90^{*})} = 52.11 \text{ lbs. per 8 hrs.}$$

*Complement of per cent of increase in warp weight due to sizing.

Nylon production formula is:

$$\frac{\text{rpm or courses per minute x runner x ends}}{36\text{" x (yards per lb. x size and oil per cent)}} = \text{lbs. produced in 8 hrs.} = \frac{384 \times 40\text{-}1/2 \times 4672}{36 \times 297.635} = 6.78 \text{ lbs. per 8 hrs.} = 7.36 \text{ lbs. per hr.}$$

58.89 lbs. per 8 hrs.

52.11 lbs. acetate times 80% efficiency = 41.69 lbs. @ 91¢ (lb. material cost) = $37.94

6.78 lbs. nylon times 80% efficiency = $\frac{5.42 \text{ lbs.}}{47.11}$ @ $\frac{\$6.02}{1.498}$ (lb. material cost) $32.63

$70.57

Star hand labor for material or labor 8 hrs. (Exhibit 1) 4.00

(Exhibit 2) 6.66

$81.23

1.724

Finishing cost .30

Freight and packing .03

$2.054*

$2.054 ÷ 6.2 yield (finished sq. yds. from 1 lb. greige cloth) = 33¢ sq. yd. mill cost.

EXHIBIT 1

textiles is to ascertain the percentage which each type of yarn represents of the total weight of a length of fabric. The percentages are then applied to the cost per pound of each type of yarn and these amounts are aggregated to ascertain the yarn cost per pound of fabric.

Cost Calculation

The calculations shown in The Cost and Specification Sheet (Exhibit 1), result in mill cost for comparison with the selling price, to show possible profit per yard. It is advisable to make further calculations to assist in making policy decisions. This is because of the difference in productivity which exists between fabrics, a circumstance which sometimes results in a lower aggregate profit per yard despite a higher yardage price. A study of Exhibit 1 will show the step-by-step development of a square yard mill cost for a given fabric.

Many special circumstances need to be reflected in this cost sheet. For example, the weight of the sizing and number of turns are elements to be considered on the specification sheet in order to get the theoretical weight of the cuts of cloth to approximate the actual weight of the piece of cloth. In most fabrics, the purpose of sizing and oiling the yarns is to strengthen them to resist chafing in the needles and to reduce breakage. In some cases, it is done to provide desired characteristics in the cloth. In the example under consideration, if the yarn producer puts two per cent size and oil on the yarn, we can reduce the

yards per pound for 75 denier by two per cent (59,527 x .98) of the formula, the application as shown in Exhibit 1 to 58,336 yards per pound. Then the theoretical weight of acetate in the cloth is reduced to 52.11 pounds. There are several viewpoints on this calculation and, under certain conditions, it may be desirable to omit the adjustment altogether.

There are other elements to consider from a production planning viewpoint, such as "plant balance" and economies made possible through confining production to a minimum variety of fabrics and deniers. Such decisions require judgment but can best be decided when supported by mathematical calculations in the above manner.

Deriving A Unit Cost

Perhaps we can quickly exemplify unit cost calculations. A plant operating three shifts five days a week will have 6,000 productive hours in a 50 week year. Assuming this to be the average plant with 20 tricot machines, the maximum productive time for the year will be 120,000 machine-hours. Assume also that there are 52,000 man-hours projected, at a yearly cost of $60,000. The fixed overhead may be estimated to be $70,000 per annum, with the variable overhead of $30,000 per annum, a total of $100,000 expense. On these figures the overhead expense per machine-hour is 83⅓¢ ($100,000 ÷ 120,000 hours). The resulting calculation of the hourly and shift costs for pricing purposes is summarized in Exhibit 2.

The Part Played by Cost in Fabric Pricing

Sound pricing usually involves quoting for each fabric an amount high enough to cover its direct cost plus its proper share of variable costs plus its maximum contribution toward fixed overhead and profit. Cost is a composite of numerous elements, some provable and some speculative. No two cost-finding procedures are identical and no one procedure will produce continuously identical results. Thus, cost-finding for pricing tricot fabrics is necessarily the assemblage of a variety of cost facts, which can be combined in a variety of ways to produce a variety of answers. Management can use them as a guide and a point of reference. Costs do not control prices but may have some limited influence.

This influence may help to counter certain others. For example, management exerts a powerful upward influence on prices in its almost irrevocable tendency to lean on the high side in computing cost estimates. Businessmen fear close

BUDGETED HOURLY LABOR AND OVERHEAD

	Hours	Amount	Machine expense 8 hours
Labor	52,000	$60,000	
Variable expenses		30,000	
Fixed expenses		70,000	
Total overhead		100,000	
Machine hours	120,000		
Cost per machine hour:			
Labor		.50	$4.00
Variable expense		.25	2.00
Fixed expense		.583	4.664
Total overhead expense		.833	6.664
		$1.333	$10.664

EXHIBIT 2

prices, preferring to allow for unanticipated cost increases. Another such influence is that accountants, by nature, are conservative. They dislike cost estimates which may turn out to be understated. They like to disregard possible cost savings in setting up costs for pricing, in hopes some addition to profit will result if the savings are realized.

These factors tend to distort cost calculation. However, it is important not to leave objective cost determination out of consideration. In today's textile market, "the buyer is king." He buys only what he needs and frequently pays the price he chooses. The buyer must offer enough to bring out the production he desires but need offer no more. The ultimate objective of production is a sale, with profit serving as the motivating agent. Therefore, two aspects are involved in the price, the first is the cost required in the production of a fabric and the other the amount obtainable at its sale. It is through knowledge and use of the first that a satisfactory relationship between the two is maintained.

A Standard Hour Incentive in a Service Company

by DAVID B. McNITT

Chief Accountant, The Acklin Stamping Co., Toledo, Ohio

There are two emphases in this paper. One is that, on experience, individual incentive has outpaced group incentive. The other is that the standard hour basis for performance makes it superior in use to straight piece work, even though the latter is on an engineered basis. Liberal industry background is included in the text of the article.

ALTHOUGH THE INCENTIVE PLAN to be presented here pertains to a dry cleaning plant, a member of the service industry, many of the problems faced were basic and must be met in any other company which establishes such a plan. In our case, we faced the necessity of paying higher wages in order to hold our employees. We employed a total number of fifty-five people and a wage increase meant endangering an already narrow margin of profit. Further, since the advent of the small synthetic cleaning shop, we were faced with a highly competitive market, making it unfeasable to increase prices.

We Were Stymied With a Group Incentive Plan

There was already in use a group incentive plan, based on standard hours, under which each department earned hours for the number of pieces which passed through it. At the end of each week, the earned hours for all twelve departments were totaled and compared with the total actual hours worked in these departments to determine the performance. Thus, if total hours earned during the week for thirty-five production employees amounted to 1650 hours and total hours actually worked by these people were 1500 hours, the premium pay rate for the week for everyone was determined as follows (with four weeks averaged in actual practice):

1650 earned hrs. ÷ 1500 actual hrs. =	110%
Less standard performance	100%
Premium pay	10%

This arrangement was subject to the defects of group incentives. If one individual became enthusiastic and put forth extra effort, he soon learned that his efforts alone did not materially alter the total performance. Also, he had the feeling that the others did not produce as he did, yet received the same premium pay. These premiums were further placed in a more or less fixed position by the averaging of the current four weeks to determine the actual premium paid. This resulted in periods when the premium pay did not change from week to week. Another occasional difficulty was that, as the average moved along, a high performance week was dropped and replaced

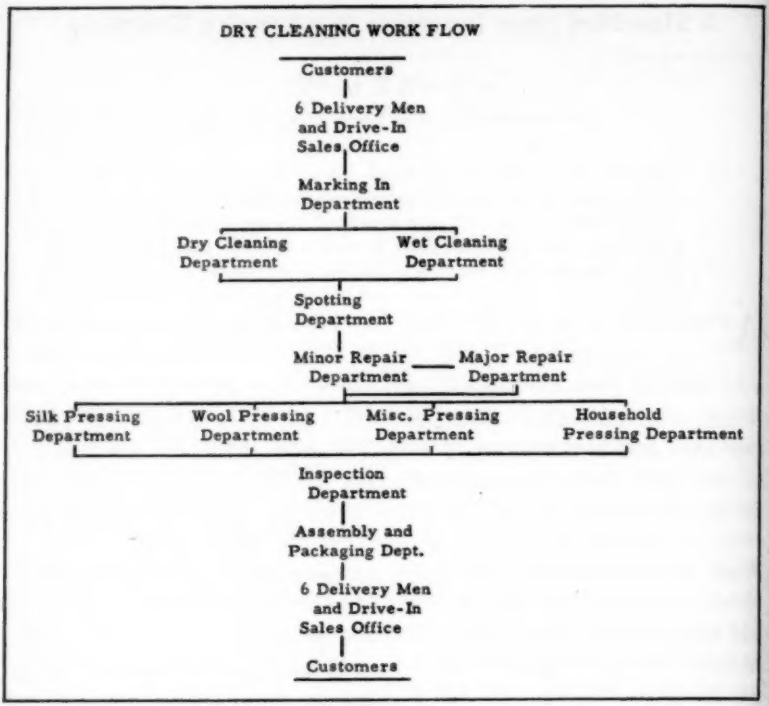


EXHIBIT 1

by a mediocre week causing a drop in premium pay.

After attempts to stimulate interest in this program, our general manager then decided to convert to an individual incentive system, also based on standard hours.

Sequence of Dry Cleaning Operations

A part of the industry background is shown on the flow chart in Exhibit 1. As disclosed there, the customers' orders are received by one of the routemen or in the drive-in sales office. They are placed in a separate canvas bag for each customer and delivered first to the marking-in department. Here the order is priced and the invoice sent to the office for processing of information. Each item of the order itself is tagged with an identifying number and separated into hampers for the dry cleaning and wet cleaning departments. From the cleaning departments, the garments are hung on hangers and pass through the spotting department for removal of spots which did not come out in the cleaning operations and then on to the repair departments.

The minor repair department will sew on missing or broken buttons or resew buttons which had to be removed to by-pass the dangers of the cleaning operations. (Many buttons will dissolve in cleaning solvent.) This department will also mend seams or small rips as an accommodation service, so that all garments will be wearable when they reach the customer. If the nature of the repair is such that it would require more time and skill to perform, the garment is routed to the major repair department. Authorization for this extra work is usually given at the time the garment is received from the customer. If not, the customer is telephoned before the work is performed.

All items are then routed to one of the four pressing departments, depending on the nature of the fabric. Generally, the routing follows this pattern:

Silk pressing department

Silk, itself, has been replaced with rayons and other such lightweight fabrics but in dry cleaning the term has remained to describe items formerly made with silk, such as dresses, blouses, lightweight skirts, unlined dress jackets, etc.

Wool pressing department

Garments generally of a heavier nature, such as all coats, men's suits, woolen bathrobes, sweaters, woolen skirts, woolen shirts, ladies' suit jackets and children's outer garments.

Miscellaneous pressing department

Smaller items, such as neckties, belts, loose peplums, etc.

Household pressing department

All home furnishings such as draperies, slipcovers, blankets, curtains, bedspreads, etc.

After pressing, the items are routed through the inspection department to be examined for workmanship of the presser and for spots which may have been missed, before passing them on to the assembly and packaging department. The assembly and packaging department then sorts out each item by the identifying number on the tag and matches them with the invoice received from the office. As an order is completed, it is routed to the routeman or to the sales office as indicated on the invoice. From there it goes to the customer.

Distinction Between Standard Hours and Piece Rates

The standard hour method of incentive pay is like piece work in basis if not in application. In piece work, a time study is made, an amount of time allotted to produce a piece, and a base hourly rate is applied to this time to determine the rate of pay per piece produced. For example, if it takes fifteen minutes to produce each piece and the hourly rate used in setting the piece price is $2.00, the piece rate would be $.50 (¼ hour × $2.00).

If a man produces forty pieces a day, his pay would be $20.00 (40 pieces × $.50). In standard hour procedure, after the time study is made, the piece is allotted the standard time of fifteen minutes. No conversion to dollars is needed at this point. In the example above, the man would produce forty pieces in a day and earn ten hours (40 pieces × ¼ hour). His pay would be the same (10 hours × $2.00 per hour = $20.00), but it would be computed in terms of a rate per earned hour rather than per piece.

The advantage of a standard hour rate as compared to a piece work rate lies in the fact that standard hour provides the incentive of piece work, yet permits management to set a different hourly rate for different employees, even though they are doing the same type of work. There are valid reasons for individual rate variations to take account of considerations other than productivity. Frequently, the standard hour method is tied in with a merit system. In these cases, employees have the incentive to be at work regularly and to do a quality job, and also have the incentive to strive for a higher hourly rate. The hourly rates in our company were established in cooperation with the union through a job evaluation plan set up some ten years ago. All changes in job pay rates have been made directly to the original evaluations. In ten years of negotiations, the question of inequity in pay rates has never been brought up.

Making the Conversion—Example of the Wool Department

The plan to substitute an individual for a group incentive plan was told briefly at first to a few key individuals. We made clear what we hoped to accomplish. Also, the union was informed, so that its management understood the proposal and could answer any inquiries put to them by employees. Additional time studies were, of course, needed to make the conversion and, on the advice of an industrial engineer consulted, were actually performed by an employee who was both trusted and known to be quite active on the union committee. This helped to instill confidence in the program.

The wool finishing department where all coats, men's suits, robes, wool shirts, sweaters, ladies suit jackets and children's outer garments are finished, was chosen to be studied first. (All members of the department were called in and were told of the time study to be made and of the intention to convert their pay to an individual incentive basis.) One of the first units in the wool department to be studied was the trouser finishing unit. This unit consists of only two presses, one for pressing tops of trousers and the other for the legs. These presses are arranged in an "L" shape, so that the operator can easily pivot from one to the other. The operation requires that he remove a pair of trousers from the pile placed at his unit, press the top,

pivot to the other press, press the legs, and place the trousers on a hanger on the outgoing line to the inspection department. Because of the small amount of time required for processing each piece — the trousers process required .04050 hours and some pieces required even smaller decimal equivalents—we studied and computed in terms of minutes per piece rather than hours. The .04050 hours then became 2.43 minutes to process the average pair of trousers.

To this time it was necessary to add allowances for normal incentive and personal time. As to the first, it was decided that everyone should earn 25 per cent of incentive pay, and a factor representing this was added to the time determined by study. As to the second, it was determined that everyone should be allowed one half hour during an eight hour day as personal time. On this basis, 6⅔ per cent additional time was added to the actual time determined by the time study. The result was that the total standard time for finishing a pair of trousers was as follows:

Time allotted as per time study	2.43 minutes
25 per cent normal incentive	.61 minutes
6⅔ per cent personal time	.16 minutes
Total time allowed for completely finishing one pair of trousers in the trouser finishing unit	3.20 minutes

In pressing trousers, it makes a great deal of difference in the pressing time if it was necessary to wet clean them in the cleaning process which preceded. If the ratio of wet cleaned trousers to dry cleaned trousers remained constant the year round, it would be a simple matter to weigh this factor in establishing the pressing rate and to make the rate the same for all trousers. However, since the number of trousers it is necessary to wet clean is much greater in the warmer season, it was decided to establish a separate rate for them. By the procedure already described, we determined the following:

Time allotted as per time study for wet cleaned trousers	3.43 minutes
25 per cent normal incentive	.84 minutes
6⅔ per cent personal time	.22 minutes
Total time allowed for completely finishing one pair of wet cleaned trousers in the trouser finishing unit	4.40 minutes

Other pressing units in the wool finishing department were studied next and rates established for each item or similar groups of items. Once the rates had been agreed upon, it was a simple matter to "pull" this department out of the plant-wide setup and to place each employee on an individual basis.

The method of determining the pay for the individual requires some extra office time for the mechanics of the operation, but does not produce any great problems. We designed a form applicable to each press operator, which was placed in duplicate at the press. Using the instance of the trouser presser again, the form adopted for this purpose is shown in Exhibit 2.

EARNED HOURS REPORTING FORM

Wool Department

Name Joe Jones Date 1/3/54

ITEM	PIECE COUNT	TOTAL	RATE	EARNED MINUTES
Drycleaned Trousers	72-48-21-50-4-1-1	197	3.20	630.40
Wetcleaned Trousers	17-4-5-2	28	4.40	123.20
			Total Earned Minutes	753.60
Actual Hours 8			Converted to Earned Hours	12.56

EXHIBIT 2

The piece count is entered by the floor lady in advance as the pieces are placed at the operator's unit for pressing. At the end of the day a deduction is made for all items not completed. The original of the form is forwarded to the office and the duplicate retained by the presser. The office then totals the piece count, extends the earned minutes, and converts the earned minutes to earned hours. At the end of the week, all the sheets for each individual are totaled and earned hours compared to actual hours. Each operator is guaranteed his actual time, but it has been our experience that, in over 90 per cent of the cases, the earned hours exceed the actual hours. In fact, the figures used in the form illustrated have not been unusual. Here the operator earned 12.56 hours pay for eight hours actually worked. Some operators will consistently earn 60 to 65 hours pay for a forty hour week.

The improved production results from this department alone were amazing. We immediately found that we could process many more pieces, at an actual reduction in labor cost per unit. Yet the operators as individuals received up to 60 per cent more money for their efforts. Another accomplishment was that the labor cost situation was simplified for us. The circumstances affecting it narrowed to the following factors, some of which are controllable:

1. Individual performing at less than 100 per cent of standard.
2. Change in pay rates.
3. Change in standard hour rates.
4. Overtime.
5. Downtime.

Once the program met with initial success, fears were allayed and we began receiving requests from the other departments to convert them next to this basis.

Special Problems Met and Solved

There were, of course, many special problems which came up with each department and were peculiar, not only to the dry cleaning industry but even to our particular firm. The press-

ing operation has been studied here in the hope that as a whole, the method of study and the problems faced would be applicable in all industries. Many companies may face the downtime problem, which is rare in our operation. However, when it does appear, it usually has a cause, such as power failure, over which the employee has no control. The policy established was to pay for this time at the same earning rate as when operating.

Expected difficulties were encountered in setting standards. In one study the worker misunderstood the objective and worked at such a speed that the resulting rate was set so "tight" it was impossible for her to make any premium. This was not yet discovered until later but was promptly adjusted. A more difficult problem is when an operator is timed at a slow-down work pace and a loose standard results. However, even though one or two rates were found to have been set a trifle loose, we had no regrets, since the thinking at the time of installation was to put in a workable incentive system which would be welcomed by the employees and not one which would discourage them. All rates were guaranteed for one year from the date of installation.

In some cases a slight improvement in methods has since been discovered, resulting in a higher output and higher premium pay. Again the thinking has been to permit the rates to remain as set, unless there is a radical change like installation of new and better equipment.

As has been indicated, the incentive was put on an individual basis, as a major improvement over the joint or group basis, wherever possible. At one time the trouser pressing operation described was done on a production line basis, with one presser doing the tops and one the legs. In doing away with this, we found that we gained, not only the time lost while the faster operation waited on the slower one but also in pride of workmanship which comes with being responsible for the complete job.

However, in the spotting department and also in the assembly and packaging department, the operations were such that they continued to be handled by all members of the department as a group and it was impossible to use the individual basis. Here we use the standard hour incentive on a group basis and all share equally in the premium hours. In both departments the groups are very small and the incentive is effective.

Accounting Principles and Pension Costs

by WILLIAM HUIZINGH

Secretary-Treasurer, Huizingh Furniture Company, Denver, Colorado

A condensed "brush up" on the most common bases of industrial pension plans and the accounting problems brought on by their adoption is offered by the present author who also confronts the reader with the implication that generally accepted accounting principles call for clear recognition of pension costs and associated liabilities.

THE PURPOSE OF THIS STUDY is to consider briefly the major types of pension plans now in operation, to cite certain surveys of current accounting practice with respect to them, to consider the applicability of some generally accepted accounting principles, and to attempt to determine whether a logical basis can be developed on the strength of which it is possible to propose a standardized method of accounting for pension costs and liabilities.

Principal Ways Pension Plans Are Financed

In order to understand the accounting problems involved, consideration must first be given to variations found in pension plans, especially in connection with methods of financing the plans. It may be helpful to note that certain aspects of pension plans do not have real accounting significance, although administrative decisions are required. For example, plans may be contributory or noncontributory, and benefits may or may not be correlated with social security. Decisions in matters of this kind will affect the resulting benefits and the company's cost, but no real accounting problems are involved. Another limiting consideration here is that so many methods of financing pension plans exist that a complete classification in terms of this characteristic is nearly impossible. For purposes of this article, only the most commonly used methods will be considered.

Pay-as-you-go plans are, historically, first. Upon retirement, employees are transferred from an active workers' payroll to a pensioners' roll as a voluntary act of the company at that time. The company incurs no pension cost until the worker actually retires and assumes no liability. Such obligation as may be implicit in policy is not recognized unless and until the worker has served to the retirement age. No problem of cost determination arises under such a plan. Only when and as the pension is paid is there a cost for tax or any other purposes. No provision is made during the years when

the prospective benefits are being accumulated. The fact that a company does assume a practical commitment to continue pension payments actually started raises the question as to whether a liability should be recognized for balance sheet purposes and, in what amount. Many have raised objections to a pay-as-you-go type of plan on the grounds that it is not realistic and does not recognize cost as it is incurred.

Group annuities represent a favored method of financing pension obligations. Operation of these plans is comparable, in some respects, to group insurance. The employer annually purchases a master policy which covers the retirement payment attributable to each eligible employee's service for that year. In effect, a unit of single premium deferred annuity is purchased once each year for each participant. The premium is based on the employee's sex and age at the date the annuity is purchased. The rate of contribution is low at the start but rises until the average group age is stabilized. Since, under this type of plan, payments are made currently to the insuror, and the insurance company guarantees the payment of annuities actually purchased, the company incurs no cumulative liability for pension payments. It is obligated only for the annual premium. Hence, no unusual balance sheet problem is involved. However, there is reasonable doubt that the annual premium payment truly represents cost to the company.

Individual retirement annuities, a third form of pension financing are in many respects similar to group annuities. A major distinction is that policies are purchased for specific individuals, so that the annual premium remains unchanged during the life of the contract. As with group annuities, the employer is obligated only for the payment of the annual premium and has no long-term liability. Cost is more readily ascertainable, since it may be computed on the basis of specific rates for certain individuals. However, purchase of these policies makes no provision for recognition of past service costs.

Self-administered pension funded plans, a fourth and frequent type, entail the creation of a trust, to which contributions are made at regular intervals. Funds are invested and the sum of the contributions and interest earned, less necessary expenses of administration, constitute the source from which pension payments are made to retired personnel. The actuary makes initial cost estimates in much the same manner as an insurance company determines its premiums. Periodically, estimates are tested against actual experience under the plan.

Principal Accounting Problems Posed

Only certain accounting problems common to most of the plans mentioned will be considered here. High on the list of problems is that of cost determination. Important facets of this

general problem involve recognition of past service costs, and the alternatives of recognition of cost as services are rendered or as benefits are funded. Of equal significance is the problem of balance sheet recognition of liability where the employer assumes responsibility for the actual payment of pensions. Only these problems will be considered in the course of this paper. Before proceeding to a study of these problems, certain unusual facts related to pension plans may well be noted. Attention will be directed to the circumstance that fixed pension benefits cannot be based on fixed contributions and to disclosures of a recent survey which exemplifies variations in accounting practice.

As to the first point the problem of funding pension plans is greatly complicated by the number of unknowns which must enter into the computation. If a company is obligated to pay a fixed sum into the fund, the planned benefit amount must remain flexible, since it is, in that case, indeterminable. Many factors could be cited which have a bearing on pension cost. Most important among inherent variables are the following, according to one author:

(1) Longevity after retirement: (2) average retirement age; (3) interest rate which must be assumed during the worker's life; (4) rate of labor turnover; (5) estimated mortality rate prior to retirement; (6) amount of investment losses. (H. Edward Brunk, Jr., *Accounting for Pension Costs and Liabilities under Current Pension Plans*, cited by Warde B. Ogden, "Survey Investigates Accounting for Pension Costs," *The Journal of Accountancy*, January, 1952.) To these variables may be added the average benefit to be paid, and the expense of administration of the fund.

As to the second point, little uniformity exists in accounting for pension costs and liability, with resulting lack of comparability among published statements of companies having such plans. Not only are the bases of cost measurement widely divergent, but there is also a total lack of agreement as to the necessity of disclosure of liability. One researcher's survey (the Ogden survey referred to above) of the published reports of 260 pension plans adopted by 200 companies, 171 of which were listed on the New York Stock Exchange (1950 calendar or fiscal periods, and covered by unqualified opinions of independent public accountants) showed, surprisingly, that 54 of the 200 companies surveyed gave no cost information whatsoever. Of the 124 companies which reported pension costs as separate amounts, 35 presented cost information in the income statement, 57 in notes to the financial statements and 32 elsewhere in the report. Twenty-two of the companies reported only part of the cost or combined pension costs with other employee benefits in a single amount.

Costs for most of the plans studied

were determined on a "cash basis," under which expense recorded for the year was equivalent to cash disbursed, either for actual pensions paid or under some funding arrangement. Some companies deviated from a "cash basis" to the extent that past service costs were recognized. Others determined costs on an "accrual basis" without regard to financing arrangements. Even within the general classifications set up, almost unlimited detailed variations were noted by the researcher.

The Problem of Cost Determination

From the foregoing, the conclusion may readily be drawn that there is real need for a study of accounting principles to determine whether or not a rational basis of cost determination for pension plans can be developed. Accountants generally agree that correct determination of income demands that the enterprise accurately reflect in its records and statements the relationship between rewards and the efforts which produce them. Since pension costs have become an essential expense of doing business, accountants must endeavor to correlate these costs as realistically as possible with the income they produce.

Inherent in the principle of matching revenues and expenses is also the idea of periodicity, which involves the proper allocation of income debits and credits to comparable periods. Allocation must be a reasonable and defensible process and its accuracy is essential to comparability between periods and between enterprises. However, closely related to the periodicity concept is acceptance of the use of estimates where it is necessary to do so. Objectivity does not always require final amounts. The principle of reliable estimates is utilized by accountants in many areas, most commonly in the case of depreciation, and can be defended on the grounds that a reasonable estimate, arrived at in the light of available facts, is better than no recognition at all of a cost obviously material in character.

With respect to pension costs, the problem of recognition of past services was one of the earliest to receive attention from many writers in accounting publications. Management had become concerned about the costs of past service recognition with respect to proposed plans, since, if the proportion of employees with long service was large when measured against total employees, the cost of the plan would be greatly increased. Further aggravating the problem was the fact that ordinarily participants with long service had achieved the higher salary brackets. Further, it may be noted that the Committee on Accounting Procedure of the American Institute of Accountants concluded that annuity costs based on past services should be allocated to current and future periods on the grounds that "although the benefits flowing from pension plans are intangible they are

nevertheless real." (Bulletin No. 36, November 1948). It can be contended that this pronouncement has established a recognized principle in accounting for past service costs.

One possible solution to the question of pension cost determination is to accrue the cost as employees render services. This approach would appear to be consistent with the accounting principles noted earlier in this report and with the line of reasoning just cited. One writer expresses the opinion that, though the actual plans differ widely as to the extent of the company's obligation to fund, or to recognize past service cost, or even to guarantee payments beyond the life of the contract, the basic situations do not vary sufficiently to warrant separate treatments. He supports his position with the following arguments:

"Pension costs and past service costs are no longer tied to the individual worker — they are more properly viewed as the result of the fact that a company now hires its labor force as a mass, calculates a total cost which is made up of many factors, and then makes payments in many directions: to the individual workers, the federal government, the state governments, trustees, insurance companies, and special funds; in addition to which it merely accrues some items as liabilities. Pension costs, current or past, are only another factor in determining the current cost of this labor force mass and should be treated on the same basis as the other overhead items; both should be accrued during the years from the beginning of the contract to the retirement of the workers involved." (Paul Kircher, "Seven Major Problems in Handling the New Industrial Pension Plans," *The Journal of Accountancy*, October, 1950).

An alternative method of recognizing pension costs would be to take up in the income account only the sum which is actually paid over to the insuror or the fund during the period. This would amount to placing pension accounting on a "cash basis." Under such a plan, retirement pensions are established as the retirements occur.

A supporter of this procedure has stated:

"From an accounting point of view it would seem that the terms of the contract provide a basis for determining the charge and apportioning it to operations. Aside from disability there is no contractual obligation on the part of the companies to pay pensions to any workers who do not actually retire within the period of the contract. To those who have satisfied the requirements of age and service and actually retire during the period of the contract the companies have assumed the obligation to pay pensions for life." (Percival F. Brundage, "Pension Plans from an Accountant's Point

of View," *The Journal of Accountancy*, January 1950).

The Problem of Balance Sheet Presentation

Closely related to the question of cost determination with respect to pension plans is that of recognition of pension liability on the balance sheet. In this area, too, a great deal of diversity of practice may be noted. Authorities in the accounting field seem to hold widely varying opinions as to the correct solution to the problem. There seem to be two principles at stake. One, a well-recognized principle of accounting, has to do with the adequacy of informative disclosure in the financial statements. Fairness of presentation requires consideration of adequacy of disclosure of material matters of every nature. So important is this principle regarded in the field of auditing that the American Institute of Accountant's Committee on Auditing Procedure has set it forth as one of three "standards of reporting," (Generally Accepted Auditing Standards," 1954). Another principle stipulates recognition of all liabilities. This principle is actually an application of the first one. It expresses the responsibility for not only ascertaining that all recorded liabilities are correct in amount but also determining that all items of liability are included. Understatement of liabilities results in a misstatement of important balance sheet ratios. Furthermore, an understatement of liabilities is almost certain to involve an understatement of cost or expense.

However, some writers have attempted to justify failure to recognize pension liabilities on the balance sheet on the grounds that many of the plans now in force are, by their very terms, not permanent. These authorities would agree to recognize the liability only in the case of workers actually retired within the period of the contract, since the company's contractual obligation under the terms of most union-negotiated plans is so limited. Still other authors take the position that recognition of liability for accrued pension costs is unrealistic, since it is predicated solely on the terms of the contract. There seems to be an assumption that the plan can subsequently be abandoned. Though most plans thus far negotiated have been for a limited term, these writers believe that unions expect to increase their demands later and have refused longer-term contracts for this reason.

Another objection sometimes raised to balance sheet presentation of pension liability is that the amount is indefinite and based on many uncertainties, even in cases in which the plan is permanent in nature. Factors which tend to make the amount of liability difficult of ascertainment were noted earlier in this article.

The point seems to be that because a figure representing pension liability could be so widely inaccurate as to be misleading, it should not be disclosed at all.

Taking a Stand

Accounting practice should always be based on sound, generally-recognized accounting theory and principle. General rules may be subject to exception and extraordinary cases may require exceptional treatment, but the burden of proof is on the accountant to bring out the unique characteristics of his problem which justify other than the conventional treatment. In keeping with the purpose of this report, which was expressed earlier, consideration must now be given to the question: Should the accounting principles which have been cited govern the method which should be employed in accounting for pension costs and liabilities or are these items so unusual that they should be handled in a different manner?

In answer, it may be said that deviation from the practice of accurately accruing expenses is nearly impossible to justify, since only through the accrual method can revenues be matched against the relevant costs and expenses of the period. Accountants should consider the treatment of pension costs quite independently of the financing methods employed. Though it is true that computation of pension costs is difficult due to several indeterminate elements which have been pointed out earlier, the total effect of these factors does not appear to be of such significance as to render a cost estimate impracticable.

Pension costs are incurred, and should be accounted for, each day a man works, regardless of when the cash is paid out to meet those costs. An accounting principle to cover the problem of cost determination has been well stated by Mr. Ogden, previously quoted, in the following words:

> "The total estimated cost of providing an employee's pension should be accrued ratably over his period of active service beginning either with the date of his employment or the date a pension plan is adopted, whichever is later, and ending with the date he retired from productive service."

The principle is realistic and is completely in agreement with generally recognized accounting theory. Failure to recognize pension liability in the financial statements cannot be justified in the light of the principle of full disclosure. The decision as to whether this item should appear in the accounts themselves or should take the form of an adequate footnote may be left to a qualified accountant, who will make the most meaningful presentation possible. Omission of so material an amount in the report is indefensible.

Executive Compensation — A Review of Considerations

by HAROLD M. SOLSTAD

Partner, Peat, Marwick, Mitchell & Company, Minneapolis, Minnesota

The kinds of executive compensation plans which exist, the responsibility for making choices among them, and problems of accounting and administration which arise in connection with them are succinctly covered in this paper. In so doing, the author draws attention to an important subject recently given a measure of general attention but not often specifically drawn within the accountant's field.

A RECENT ARTICLE on the subject of executive compensation stated that an executive who received $25,000 in 1939 must receive $85,000 today simply to break even as a result of increased living costs and taxes. It is therefore not surprising that particular methods of executive compensation such as restricted stock option and deferred compensation plans which may provide capital gains taxable at lower rates or spread income over retirement years and consequently permit it to be taxed at lower rates are receiving attention.

However, tax advantages should not be the only criteria in formulating an executive compensation plan. This paper attempts to cover in brief fashion the business objectives sought to be accomplished by particular plans and the corporate as well as tax accounting aspects of particular plans.

The Business Problem

The broad business problem is to decide who to reward and how much to reward them. Top management consisting of the president and the board of directors, or, in the case of large companies, a salary and compensation committee of the board of directors, is the only group within the corporation with sufficient authority to decide these primary compensation objectives. The problem of deciding who to reward involves first of all a determination of the composition of the executive group. One approach would be to consider that all persons receiving salaries in excess of a particular amount constitute the executive group. Here the danger is one of blanketing in such a large group of "middle management" that any form of incentive compensation might be spread so thin that the incentive aspect loses its effectiveness or, if larger amounts are made available, that the aggregate amount may be unreasonable from the viewpoint of stockholders and workers. Some companies have found that bonus distributions to large groups are soon thought of as part of basic compensation with the result that such

bonuses become "frozen" into the ordinary compensation structure. Also, it frequently happens that numerous persons who have not exerted themselves particularly are in effect rewarded for real contributions made by other members of the group.

It would seem that a sounder approach to the determination of the composition of the executive group would be to attempt to segregate administrative personnel from policy-making personnel and to restrict the executive group to persons who formulate policy and have the responsibility for execution of formulated policies. On this basis is a small company, the chief executive officer may be able to direct single-handedly the sales, production and financial policies of the company and accordingly the duties of other officials are nonexecutive in nature, regardless of the designation of such officials. At the other extreme, a large company with multi-plant operations may require several hundred executives whose responsibilities would be generally comparable with those of the chief executive of a small company. In addition to the size of the company, the nature of the industry affects executive requirements. An executive would have to assume narrower responsibilities in an industry subject to rapid technological changes and more executives would be needed to successfully direct profit-making possibilities.

After deciding on the overall composition of the executive group, it is necessary to evaluate the relative contributions to overall profits of different members of the executive group and here the personal qualifications of individuals as well as the functional aspects of the various positions assume importance. As co-ordinator of all policies, the compensation of the president or chief executive, including salary and bonus, may be twice as much as the compensation of either the chief sales or production executive and three or four times that of the executive responsible for finances, accounting, purchasing, industrial relations, etc. The differentials would not be as great on the basis of salary compensation only and, of course, the greater the differentials, the greater the risk and the less security attached to the higher paid positions. It is important for top management to subject such differentials to periodic reappraisal.

In formulating an executive pay policy, it should be recognized that a number of factors have appeared which served to emphasize the desire for security in the form of retirement plans. These include the shock of the depression in the early thirties, the increased costs of retirement in an urban rather than rural civilization and the steeply graduated income taxes which make it almost impossible for the executive to provide for his own retirement. The tax laws have made it practicable for a corporation to provide for its employees, including executives, as a cost of doing business, certain benefits

which are denied to individuals acting in their own behalf. The tax relief thus provided for corporate taxpayers is presumably passed on to consumers in the price structure of purchased goods and services or in the form of higher tax rates, even though a portion will be eventually recouped in future years when recipients are taxed on compensation received.

Substitutes in part for higher executive compensation are non-financial considerations such as loyalty, power, prestige and social position. One author (Thomas H. Sanders "Effect of Taxation on Executives" Harvard Business School 1951) concludes that the importance of nonfinancial stimuli, plus ingrained work habits, makes executives able to operate even under financial "disincentives".

The Part the Accountant May Play

While the objectives of deciding who to reward and generally how much are broad business considerations rather than accounting ones, many of the problems of implementing the objectives either require both accounting assistance and the advice of professional consultants or else are purely accounting matters. The selection of the method of executive compensation may require the professional advice of attorneys, pension plan consultants, actuaries, trust companies, life insurance companies, etc., but the ultimate responsibility for seeing that required contributions are made, recorded and reported for corporate and income tax purposes and that authorized distributions are made to participants is an administrative one usually borne by the treasurer, controller or chief accounting executive or shared by him with an administrative committee. In the following section of this paper a number of methods of executive compensation are reviewed from both corporate and tax accounting viewpoints, under three general classifications — salaries and current bonuses, stock purchases and option plans and retirement plans.

Methods of Executive Compensation

Salaries and current bonuses present no particular corporate or tax accounting problem, since they are generally deductible, subject to the overall requirement of reasonableness, upon accrual. They are taxable to the executive when received and as a consequence may be of little benefit to executives in high top brackets. The Securities and Exchange Commission requires disclosure in annual reports filed with it of certain individual and group salaries of top executives.

Cash bonuses spread over a short period of years may even out income for the recipients but may present a hazard for the corporation since there must be income in future years against which to claim bonus payments as tax deductions.

Stock purchase and restricted stock option plans do not have any direct

tax benefit to the corporation since a deduction is not allowed the corporation. If the prescribed holding periods are complied with and the option price was 95 per cent or more of the fair market value at the time the option was granted, the gain upon sale will be taxed at capital gain rates. If the prescribed holding periods are complied with but the option price was at least 85 per cent but less than 95 per cent of the fair market value, any gain is not taxable until the stock is sold or at death, and then as ordinary income to the extent of the excess of the lower of market price at either the option or sale date over the option price with the remaining gain taxed at capital gain rates. Disclosure of pertinent details of stock option plans is required in financial statements according to the rules of the Securities and Exchange Commission and the standards of the American Institute of Accountants. Compensation would be recorded as an expense in the corporate accounts, with an offsetting credit to paid-in surplus, to the extent of the excess of fair market value (reduced by selling expenses otherwise incurred) over option price at date of granting the option.

Maximum benefits under deferred compensation plans are achieved when contributions by the corporation are deductible when paid or accrued, fund earnings are tax-free until paid out and payments are taxable to executives when received. In order to receive such favorable tax treatment, pension, profit-sharing and stock-bonus plans must qualify under the appropriate provisions of the Internal Revenue Code. Briefly, there must be a determinable amount of compensation set for all participants and the allocation to each participant must be made in accordance with a predetermined formula, the plan must provide for irrevocable commitment of funds necessary to discharge the liabilities accruing under the plan and the plan can not discriminate to any large extent in favor of officers, shareholders, or highly paid employees as to coverage, contributions or benefits.

Thus, qualified deferred compensation plans are funded plans under which all contributions are paid to an independent agent who manages the contributions collected and earnings on the investment of the fund. The agent may be a life insurance company (insured plan) or trustee (trusteed plan). Under a pension plan, contributions are determined actuarially on the basis of the deferred payments, whereas under profit-sharing or stock bonus plans, amounts of deferred payments depend on amounts contributed to the fund and the earnings thereon. The annual contribution to a stock bonus or profit-sharing trust is limited to 15 per cent of compensation otherwise paid or accrued to participants with an additional 15 per cent allowable if the permissible deduction in prior years was not fully utilized. In

the case of pension trusts, the test is generally 5 per cent of compensation otherwise paid or accrued, together with amortization of the past service cost. After participants' rights have become nonforfeitable, such plans constitute contractual arrangements between the corporation and participants.

The Securities and Exchange Commission requires disclosure in financial statements filed with it of pertinent features of pension and retirement plans.

If paid in one year to the participant on the occasion of his separation from service, total distributions of the executive's account under a qualified trusteed plan are considered capital gains to the extent they exceed his contributions.

Nonqualified deferred compensation plans should be studied carefully to ascertain their tax status. In general, where the participant's beneficial interest is nonforfeitable, contributions are deductible to the corporation to the same extent as salary and taxable to executive when earned. Where the participants' beneficial interest is forfeitable, contributions are taxable to the executive when received, and deductible to the corporation at time of payment.

Problems Arising in Accounting for Compensation Plans

Corporate accounting requirements of the several methods of executive compensation vary with the complexity of the plans. Gross amounts of executive salaries should be authorized by the board of directors and deductions for withholding and social security taxes and for other purposes must conform with statutory and contractual requirements. Distribution to costs and expenses should conform with prescribed accounting policies.

Current bonuses are frequently determined on the basis of a formula prescribed by the board of directors which may be quite simple or may be comparable to the one described in the following paragraph for qualified bonus and profit-sharing plans. The distribution of the bonus fund may be prescribed by the board of directors or the distribution of all or a portion of the fund may be left to the discretion of the chief executive officer. Whether the distribution is discretionary or prescribed by formula, it should be based on objective data to the maximum extent possible and this will require breakdowns of overall profits by individual plants in the case of multi-plant operations, by divisions, departments and products, in general conforming with functional lines of authority and responsibility to the maximum extent.

Contributions under qualified bonus and profit-sharing plans are determined on the basis of a specific formula set forth in the plan. For example, the plan may provide for a contribution based on a fixed percentage of taxable or book income before or after provision for income taxes, pos-

sibly after certain adjustments to income for capital gains and losses, etc., and after a stipulated return on stockholders' equity. It is an accounting function to interpret the provisions of the plan so that required contributions are made, recorded and reported for corporate and tax accounting purposes. In the case of pension plans, the required contribution would be computed by an actuary on the basis of certain accounting and statistical data.

Annual reporting for corporate accounting purposes of bonus and profit sharing contributions may present problems when they are deductible for tax purposes in a different accounting period. Seasonal fluctuations of earnings may require that bonus and profit sharing contributions be computed on estimated annualized earnings in interim reports to stockholders in order to avoid distortion of quarterly or semi-annual figures.

In connection with accounting requirements for the plan itself, certain records for investments, etc., would be maintained by the trustee and other records for participants' accounts, etc., would be maintained under the direction of the chief accounting executive.

Balancing Advantages and Disadvantages of Available Methods

Salaries represent the most widespread form of executive compensation and, in general, should "stand on their own feet."

Cash bonuses paid currently are powerful incentives to extra effort since the reward follows so closely on performance. Many younger executives would rather pay somewhat higher taxes in order to have more current income to meet living expenses for growing children, school and college education expenses, etc. However, further salary increases and cash bonuses mean little to top executives in high tax brackets and, accordingly, postponing receipt of funds to executives for a period of years may be more attractive in holding older executives.

Stock purchase and stock option plans may provide working capital for the corporation, but for this reason are better suited to top executives since substantial investments are usually required. From the individual's point of view, stock option plans may be desirable since they provide the executive with an opportunity to obtain an equity interest in the corporation without incurring a risk at least until after the option is exercised.

Profit-sharing trusts may be more suitable than pension trusts in smaller companies, in companies where there is a high wage-salary to profit ratio and where earnings are subject to wide fluctuation, since contributions are generally not required if there are no profits. High average age groups may require greater pension contributions than the company can afford, particularly with regard to past service costs.

Letters to the Editor

A PROBLEM NOT EASILY SOLVED

Editor, N.A.C.A. Bulletin:

I SUSPECT THAT YOU will receive comment from readers on the article, "Solution of a Problem in Placing Fire Coverage," by O. T. Case, which apeared in the September, 1954, issue of the *N.A.C.A. Bulletin*. The article is correct as far as it goes but, I believe, it is also misleading. As a trade association for the laundry industry we are constantly called upon to counsel our members in insurance, accounting, financial and related matters. In this connection we have studied the problems of our members and have arrived at some conclusions which vary from those presented in the article.

The article does not state that the group of mutuals used for comparison operates in a manner different from those of the majority of mutual insurance companies.

It seems to be the practice (of the company discussed in the article) to charge a rate about three times that of a bureau rate and, at policy expiration, to pay an extremely large dividend—say 69 per cent—which brings the ultimate rate somewhat below the bureau rate.

Exhibit 1 illustrating the paper shows a calculation of interest on the excess premium (or dividend), which is added to the one final premium to get the actual premium, giving consideration to the fact that the insurance company had the use of the money, rather than the company and that it was costing the company about 4 per cent. This conclusion is, of course, correct. However, I think an analysis should have been made of a standard type of mutual. In that case, the stock company premium figure would apply, less the 15 per cent dividend:

X Mutual Cost, $6,303
Stock company cost $6,001 (Bureau rates assumed to have been used)
Standard mutual cost $5,100[1]

In our trade association work, we do not sell insurance. We were well aware that insurance cannot be bought on the basis of rate alone and that there are many considerations involved in shifting coverage from one company to another. Several of these considerations may be as important as the saving in rate. I repeat that the conclusions reached in the article mentioned are not incorrect but could be dangerous.

ROBERT O. BROWN, *Fox River Valley Chapter*

A DEPRECIATION RESERVE FOR GOVERNMENT-OWNED FACILITIES?

Editor, N.A.C.A. Bulletin:

FOR THE INDIVIDUAL CONTRACTOR using Government-furnished facilities, they present many problems, not all of which were solved with the successful negotiation and execution of a facilities contract. As the years have passed, the contractor has found that he must maintain property records in greater detail than he would use for his own facilities. Also he must maintain the equipment as if it were his own. Further replacement is contingent upon available funds and it now appears that funds will not be provided for this purpose and that the contractor will either be expected to make the replacement at his own expense or suffer a corresponding decrease in his productive capacity.

It is an economic fact that all plant and equipment depreciates with use and time. It is also an economic fact that fail-

[1] Stock company cost $6,001 less 15% dividend ($901), resulting in a standard mutual company cost of $5,100.

ure to replace worn-out or obsolete plant and equipment will result in high maintenance cost, inadequate labor realization, and hence reduced profits. Should not then all companies operating with Government facilities be planning and providing for their replacement, or planning for reduced volume and retrenchment? The fact that competitors also operating with Government facilities are not so providing and do not include in their selling prices any charge for Government facilities should not obscure the consequences of this omission.

A still further complication arises upon expiration of the contracts for which the facilities were originally provided. As long as it can be clearly demonstrated that the facilities will be used on other government contracts, it is usually possible to retain them on a no-charge basis. However, if this is not the case, a rental contract at the rate of one per cent of the value of the facilities per month can be obtained. Inherent in such rental contracts are the normal dangers of renting, plus the additional dangers that the Government will be in no position to furnish new equipment at the same rate, when the facilities being rented are worn out. This places upon the contractor the intolerable burden of a regular monthly charge for rental plus the charge for ultimate replacement and should speed his decision on the basic problem.

There are two alternate methods of replacing Government facilities:

1. Set up a depreciation reserve by a regular monthly charge to operating costs.
2. Secure additional investment capital to finance what is, in reality, an expansion of capacity.

In the case of the first method, you will immediately encounter the argument that such a charge is not an allowable cost for tax purposes and hence is not practical. However, careful comparison of the results of this method with the results obtained from additional investment capital will clearly prove that there is little choice between the two on this account. Investment capital must always be paid for through dividends or interest. If the choice is stock, the dividends are, of course, not an allowable tax deduction. If the choice is borrowing, while the interest is an allowable deduction, it will be a double charge during the period that the facilities are depreciating through normal procedures.

In addition to the arguments presented above, investment capital is difficult to procure for expansion of "war industries" when present government plans indicate that demand will gradually reduce during the next five years. Because of this factor and for the other reasons outlined above, it is here recommended that companies operating with government facilities should provide a reserve for their replacement according to the following criteria:

1. Present age and estimated remaining useful life of the government facilities which are now being used. (Bear in mind that many government facilities are second-hand at the time they are received into a plant.)
2. Estimated replacement cost of the facilities.
3. Anticipated facilities requirements at the time replacement will be necessary. Do not reserve for facilities requirements which under present government planning probably will not be required after the expiration of their useful life.

ROLFE WYER, *San Diego Chapter*

AMORTIZATION DEDUCTIONS—CAN YOU SUBSTANTIATE THEM?

Editor, N.A.C.A. Bulletin:

BY TIMELY ACTION, we can prevent the identification for tax purposes of certified facilities from becoming one of our future problems. However, we must recognize the requirement involved. Most applications for necessity certificates were based on estimated costs and were required to be filed

(if they involved construction estimated to cost $100,000 or more) in advance of actual building operations. Undoubtedly many expansion projects were certified on the basis of preliminary plans which subsequently had to be revised in major or minor details. The regulations under which necessity certificates were issued clearly state that "it will be incumbent upon taxpayers electing to take the amortization deduction to establish to the satisfaction of the Commissioner of Internal Revenue the identities of the facilities, the costs thereof and the dates relative thereto. . . ."

The Defense Production Administration, the originally designated certifying authority for tax amortization, recognized that a problem existed and provided that ". . . where the actual description or cost of a certified facility varies or will vary so materially from the description or cost in the application for the certificate as to put in question the identity of the facility, the taxpayer may request an amendment of the certificate by filing a statement with the certifying authority setting forth the revised description or cost. . . ." It will be noted that this leaves the burden of proof with the taxpayer.

An interpretation was later provided by the Office of Defense Mobilization, successor agency to the Defense Producton Administration for certification for tax amortization, to the effect that no amendment is necessary where" . . . (1) the facility acquired or constructed is the same as that certified, even though the actual cost exceeds the cost of the facility as estimated in the certificate or (2) where the facility acquired or constructed varies from the facility certified and the actual cost exceeds by not more than 15 per cent the cost estimated in the certificate. . . ."

Ostensibly, this would seem to cover every project which does not exceed the estimated cost by more than 15 per cent. However, since the official definition of "emergency facility" states that it means any facility, lands, building, machinery or equipment or any part thereof, an expansion project might be within the 15 per cent in the aggregate, yet have a number of individual items which exceed the 15 per cent rule and which, thus, are in the doubtful category insofar as eligibility for tax amortization is concerned. By the same token, it is a rare project which can be described so exactly in advance that it can be said later to be the same as that certified.

To remove this uncertainty, we consider it advisable to file a request for an amendment to each necessity certificate upon completion of the project it covers. With the records readily available, this is a more convenient time than any future date to assemble the necessary data and prepare a revised Appendix A (the exhibit showing the individual items certified) in the same detail as it was originally prepared for the application. Showing (1) the certified facilities and their estimated costs, (2) the facilities actually acquired, (3) the dates of acquisition and (4) the actual costs, this revised Appendix A should be footnoted to explain the reasons for major changes, if any have occurred. The Office of Defense Mobilization requires four copies of this exhibit and it is useful to explain in general terms in a letter of transmittal the reasons which made the changes necessary.

To date a number of requests for amendments have been granted—with copy to the Commissioner of Internal Revenue—and with these amendments the accountants can close his files for each certified expansion project, secure in the knowledge that the identity of the facilities have been established and approved beyond future challenge.

GLENN N. DURBAN, *Albany Chapter*

Notes on Current Reading

Books

The Punched Card Annual 1954-55

Punched Card Publishing Company, 502 Maccabees Building, Detroit 2, Michigan, 1954, 224 pp., $6.00.

This is Volume III of an annual series of compendia of articles on tabulating equipment applications, interspersed with advertisements of equipment manufacturers. Its forty or fifty papers start with "The Machine Accountant's Role in Electronic Data Processing" by T. V. Learson and "Four Milestones in the Evolution of Office Automation" by M. E. Mengel. Other papers rather "box the compass" on punched card applications to accounting routines.

Articles

How Much Do Personnel Activities Cost?

Dale Yoder, Personnel, November 1954.

This paper reports the University of Minnesota's 1954 budget study of personnel departmental costs and staff requirements. First identified are the most frequently recognized departmental functions. These are then given expression to in "per capita functional costs" and "average functional ratios," both by industry groups. An increase from $48.59 in 1952, to $61.26 in 1953 and $69.34 in 1954 is noted for "average costs of providing staff services per employee."

Operations Research: Past, Present, and Future

Philip M. Morse, Advanced Management, November 1954.

There is a fair amount of leisurely explanation in this article which is of the type of presentation on its topic which does not confront the reader with "mathematics en masse." However, central to the thought of the paper is the "unifying influence of the mathematical model" and the discussion points out the areas in which construction of such a model is the significant first step toward problem solution.

Operations Research

Harry B. Wissmann, Management Methods, November 1954

Introductory and historical at the start—as to the development of the operations research team idea before and during World War II—, this article passes to description of problems dealt with through this technique. These include production scheduling under conditions of fluctuating sales, cost-quality balance studies, and location of distribution facilities. The closing paragraphs tie operations research closely to the functions of management.

Let's Talk About Operations Research

Frank T. Hulswit, Systems and Procedures Quarterly, November 1954.

Here is a short article on what is acknowledged to be a long subject. It contains the sentence, "Being a science, operations research attempts to understand, not to act." A few instances of application are given. One of these relates to determining the physical magnitude of certain clerical tasks. The technique of operations research is described as "complementary, not competitive," rendering the end-product of other staff services more useful.

SELECTED ARTICLES FROM ACCOUNTING PERIODICALS

ACCOUNTANT'S JOURNAL, *September 1954* (304 Burke Building, Manila, Philippines, single copy $1.00)

A Case Study on Fraud, Generoso P. Salazar
History of Account Keeping and Bookkeeping, Washington SyCip
Internal Auditing for a Life Insurance Company, Adolfo R. de Leon
The Administrator and the Internal Auditor, Daniel M. Braum
Functions and Activities of the Controller, J. J. Punzalan

THE CONTROLLER, *November 1954* (1 East 42nd Street, New York 17, New York, single copy $.50)

Concerning Management Consultants, Marshall Granger
The Annual Report: The Controller as Chief Architect, Jules A. Schwartz
Depreciation Allowances and Production Costs — A New Approach to an Old Problem, Ernest H. Weinwurm

THE COST ACCOUNTANT, *November 1954* (63 Portland Place, London W-1, England)

Problems of Compilation of Selling and Distribution Costs, W. L. Spalding

COST AND MANAGEMENT, *October 1954* (66 King Street E., Hamilton, Ontario, Canada, single copy $.50)

Principles of Direct Costing, W. R. Wright

JOURNAL OF ACCOUNTANCY, *December 1954* (270 Madison Avenue, New York 16, New York, single copy $.75)

Accounting for Depreciation Under New Income Tax Methods, AIA Research Department

Place of The Methods Groups Within the Organization, Joseph Polej

NEW YORK CERTIFIED PUBLIC ACCOUNTANT, *November 1954* (677 Fifth Avenue, New York 22, New York, single copy $.50)

Accounting Aspects of Oil and Gas Production, George W. Lafferty
But Is It Accounting? A. C. Littleton
Composite Depreciation Under the Sum-of-the-Years'-Digits Method, Jacob Heskes
A Case Study in Cost and Expense Reduction for a Large Electrical Equipment Manufacturer, James P. McCully

Criteria for Selecting Electronic Equipment

Beardsley Graham, Systems, November-December 1954.

In a two page discussion, the author of this paper stresses the need to make sure that the promise of equipment will be realized before going ahead. A "joint examination by engineering and management to determine the areas most likely to be fruitfully mechanized" is recommended. The author also expresses his expectation that the future of electronic equipment will be bright in terms of extended application in accounting.

Electronics Charts The Sales Picture

A. B. Sand, Systems, November-December 1954.

This study proceeds on the experience of Rexall Drug Company, as presented by the author, an Assistant Controller of the company. He describes the equipment used to develop "A sales potential picture for the more than 3,000 countries in the United States"—through a "series of complex calculations." The article, which is concise, is identified as the periodical's "Data File No. 749."

SELECTED ARTICLES FROM BUSINESS PERIODICALS

ADVANCED MANAGEMENT, *November 1954* (74 Fifth Avenue, New York 11, New York, single copy $.75 to members; $1.00 to nonmembers)

Operations Research: Past, Present and Future, Philip M. Morse
How Comprehensive Are Your Management Development Plans? Joseph M. Trickett

AMERICAN BUSINESS, *November 1954* (4660 Ravenwood Avenue, Chicago 40, Illinois, single copy $.35)

Pennyless Bookkeeping Solves Accounting Delays
Job Evaluation for Salaried Workers, G. Slaton

DUN'S REVIEW AND MODERN INDUSTRY, *November 1954* (99 Church Street, New York, New York, single copy $.75)

How to Make Money from Small Orders, Donald R. Longman

MANAGEMENT METHODS, *November 1954* (141 East 44th Street, New York 17, New York, single copy $.50)

Operations Research, Harry B. Wissmann
How to Cut Traffic Costs, Ross W. Bennington

THE OFFICE, *November 1954* (270 Madison Avenue, New York 16, New York, single copy $.25)

Avoid These System Pitfalls, Leslie H. Matties
Convair Sets Work Standards for Duplicating, Charles Lahr, Jr.

OFFICE MANAGEMENT, *December 1954* (212 Fifth Avenue, New York 10, New York, single copy $.25)

Alcoa Inaugurates Integrated Data Processing on National Scale, Ralph W. Fairbanks
A.M.A. Conference Concentrates on Computers.

PERSONNEL, *November 1954* (330 West 42nd Street, New York 36, New York, single copy $1.00)

*How Much Do Personnel Activities Cost? The 1954 Budget Study, Dale Yoder

RETAIL CONTROL, *November 1954* (100 West 31st Street, New York 1, New York, single copy $.75)

Productivity Measurement and the Figure Exchange, E. B. Cagle
Incentive Wage Systems and Salespeople's Salaries, Henry Noyer
Let's Talk About Operations Research, Frank T. Hulswit
Electronic Business Machines — Today and Tomorrow, Milton E. Mengel
Electronic Data Processing, J. Henry McCall
Realistic Quality Standards, Vincent H. Kane

SYSTEMS, *November-December 1954* (315 Fourth Avenue, New York 10, New York, single copy $.35)

*Criteria for Selecting Electronic Equipment, Beardsley Graham
*Electronics Charts the Sales Picture. A. B. Sand

SYSTEMS AND PROCEDURES QUARTERLY *November 1954* (Box 281, Wall Street Station, New York, New York, single copy $1.00)

*Let's Talk About Operations Research, Frank T. Hulswit
Electronic Business Machines, Milton E. Mengel
Electronic Data Processing, J. Henry McCall

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* Further mentioned in accompanying notes on particular articles.

For Your Information

THREE R'S—ALL OF THEM READING

EVERY ONCE IN A WHILE (we do it too) someone gets around to suggesting a few pieces of literature with which men of a particular profession might well surround themselves. Such lists have a certain fascination. It may be suspected that the most red-blooded action man occasionally sees the picture of a scholar in his mirror. At least this is more than likely to be true if he is a professional man. He may place great store in his ability to make spontaneous analyses of situations within the framework of his calling as he once studied or climbed aboard it and he may place like weight on either tact or persuasiveness in conference but, in his heart, he knows that continuous, practical study will clarify his approach to his work. He knows that there is no profession without its learning and it tickles him more than he will admit to think of having a few shelves of helpful books, a handsome desk, a comfortable chair—and himself in it.

That a professional library has this appeal is certainly all to the good. Books? Yes. Manuals? Yes. Research studies? Yes. Literature of other fields? Yes. Specialized literature? Yes. Yes all down the line—but what selections? That's no easy problem. As said at the start, suggestions are periodically offered. The writer of these words remembers his own earnest compilation of such a list in answer to a technical service inquiry nearly as decade ago. More recently (Janaury 1954) and on a broader basis, National Headquarters has put together and duplicated to supply members who request it a 140-item list of a possible company or industrial accountant's personal library. This list embraces a wide variety of materials, is grouped by classifications, includes new and old works, names publishers (with addresses) and prices, and is available to those who want it. However, it is *a* list—not *the* list. Many would wish to vary it.

What gives rise to these comments at this time is a contribution from a different source (the source always matters, for it is likely to dictate emphases). In the October 1954 issue of the (quarterly) *Accounting Review* (College of Commerce, Ohio State University, Columbia 10, Ohio, single copy $1.50), the organ of the American Accounting Association which is largely the association of accounting teachers, there appears an (also) 140-item alphabetical-by-author suggested library list. This, to quote from the paragraph prefacing it, was "selected by Alton G. Sadler, Associate Professor, University of North Carolina, and . . . arranged for publication by Kenneth F. Easter, an M.B.A. Service Scholar." It is entitled, "Professional Accountants Library" and the list was included in an accounting exhibit by "the graduate class in accounting system" last May.

Perhaps this list, also, will help you with yours. In the field of accounting literature proper, it contains texts on general and cost accounting (as a list, it is not heavily weighted toward costs) auditing, internal control, public practice, and the work of the controller. It lists American Institute of Accountants material, a variety of handbooks including the Lasser series, and Walton textbook material. It includes specialized texts in government accounting, public utility accounting, hospital accounting and quite a few industry accounting manuals. Since half dozen Tennessee Valley Authority publications are present, the reason may be geographical. There is material on depreciation, taxation, and budgeting. The last two *N.A.C.A. Conference Proceed-*

ings published in book form (1950 and 1951) are named and also the five N.A.C.A. research studies grouped under the title *How Standard Costs Are Being Used Currently.*

Beyond accounting, as such, many fields of knowledge are touched upon by books listed. Among these are industrial management, business law, retail credit, security analysis, office methods, forecasting, collective bargaining, financial mathematics, "the public speaker's treasure chest," business statistics, and others.

ABOUT "CLASSIFIED FACTS"

Elsewhere in this department in this issue there appears material relating to an industrial accountant's libary. The source around which the text is written does not ignore statistics but neither does it emphasize this area of interest. However, the times do emphasize statistical information and so does the part which industrial accountants appropriately plan in forecasting. Hence, the pamphlet, *What's the Answer?* just reprinted by the Committee on Business Statistics of the Chamber of Commerce of the United States (available from the Chamber's Economic Research Department, Washington 6, D. C., single copy .50¢) may be said to have established relevance, especially as reflected in its subtitle, "A Brief Guide to Sources of Business Statistics," as well as the statement in its foreword, "This pamphlet outlines how to acquire and organize a low-cost statistical library."

The pamphlet is compact, being 24 pages in length, first describes where primary data on communities and counties, states, industries and the nation may be found. It then recommends a group of about a dozen "basic" data sources, describes some of the organizations (government and other) which may be consulted when data sources are wanted, and goes on to a descriptive list of published sources, classified as follows:

General statistical and economic data.
Banking and finance.
Federal government.
State and local governments.
Income and savings.
Labor force and social security.
Population, housing, and construction.
Agriculture.
Manufacturing and minerals.
Retail and wholesale trade.
Transportation, communication, and public utilities.
Foreign trade.
Foreign statistics.

The publications listed are keyed as to whether available from the Superintendent of documents, Government Printing Office, Washington 5, D. C., or from the agency or publisher shown. In the section of the pamphlet dealing with the formation of a statistical library, the Commerce Department's monthly "Survey of Current Business" ($3.25 a year's subscription) and annual "Statistical Abstract of the United States" ($3.50) are given most emphatic mention, with the suggestion that the latter be repurchased every few years if the funds are needed to purchase other items to form a more diversified collection.

COMPANY TRAINING OF ACCOUNTING STAFF

IT IS DIFFICULT TO BELIEVE wholly in education through experience in any field, and perhaps very few people really do, although they may seem to express this opinion in the course of emphasizing the truth that experience is the deepening process of "living out" a career which is best begun by education for it. It is hard to deny that, as education, the lessons of experience, despite their penetrating character, are poorly proportioned, discontinuous, give no hint of the limits of their value, do not cover the field, build overconfidence and spotty performance (all of which defects natural ability have overcome in many instances, one

way or another), and, in short, bear many marks of being "good for this trip (job) only."

But what about education which accompanies experience, seeks to overcome its lacks and to distill its meaning? A good case can be made for this combination and for the process by which the educative side of it is known, i.e., training—on-the-job, for-the-job or beyond-the-job. There are many who will rate the potential of such training above the potential of education apart from it. Parallel-to-job training certainly matches a need in most walks of life in this technological age where at least part of yesterday's information is, if not today's ignorance, at least today's limitation.

Parenthetically, it may be pointed out that the educational services of such Associations as N.A.C.A. play a part, which may well be major, in this area. However, the purpose of this note is to call attention to another side of the occupational training picture as it relates to accounting. This side is company training of staff, primarily the younger segment with its greater range and frequency of promotability. Unlike the activities of educational institutions and associations, staff training, even where successful, is commonly improvised. Hence, the adaptable experience of other companies is particularly helpful so that this improvization may run toward effective devices and steer clear of ineffective ones.

Too much should not be expected of the articles to be mentioned here. Their chief merit as additives to a company's own approach to employee training is that they reflect genuine experience, emphasize the importance of the subject, and indicate its general (elementary) stage of development. If they indicate that a large part of the "training" is extended orientation or a check on the effectiveness of unscheduled training left to supervisors to impart or if the training is for the job rather than the occupation, these reflect bona fide situations relevant to the training effort. It will at least be found that the conduct of group meetings is suggestively covered.

In the September 1954 issue of *The Internal Auditor* (120 Wall St., New York 5, N. Y., single copy $1) appears a paper entitled "Staff Education and Training" by William J. Townsend of Canada Packers. Besides features which have already been indicated, this paper lists ten points of a questionnaire which were directed to employees in "two of the large accounting departments of our business."

An article, "The Increasing Importance of Staff Training Programs" by Edward M. Boulter with Price Waterhouse & Co. (Los Angeles office) was included in *The Journal of Accountancy* (270 Madison Ave., Ave., New York 16, N. Y., single copy $.75) for August 1954 as a "step-by-step discussion of organized instruction in a public accounting firm." The conduct of "discussion meetings" is given considerable attention.

More broadly, the subject of employee training—for sales, production, office, and management personnel—was the subject of a special conference on training and management development held in Atlanta, Georgia, by the American Management Association (330 West 42nd Street, New York 36, N. Y.) on December 9 and 10, 1954. Advance announcements reported that material provided those in attendance would cover individual training, group discussions, indoctrination, and other topics.